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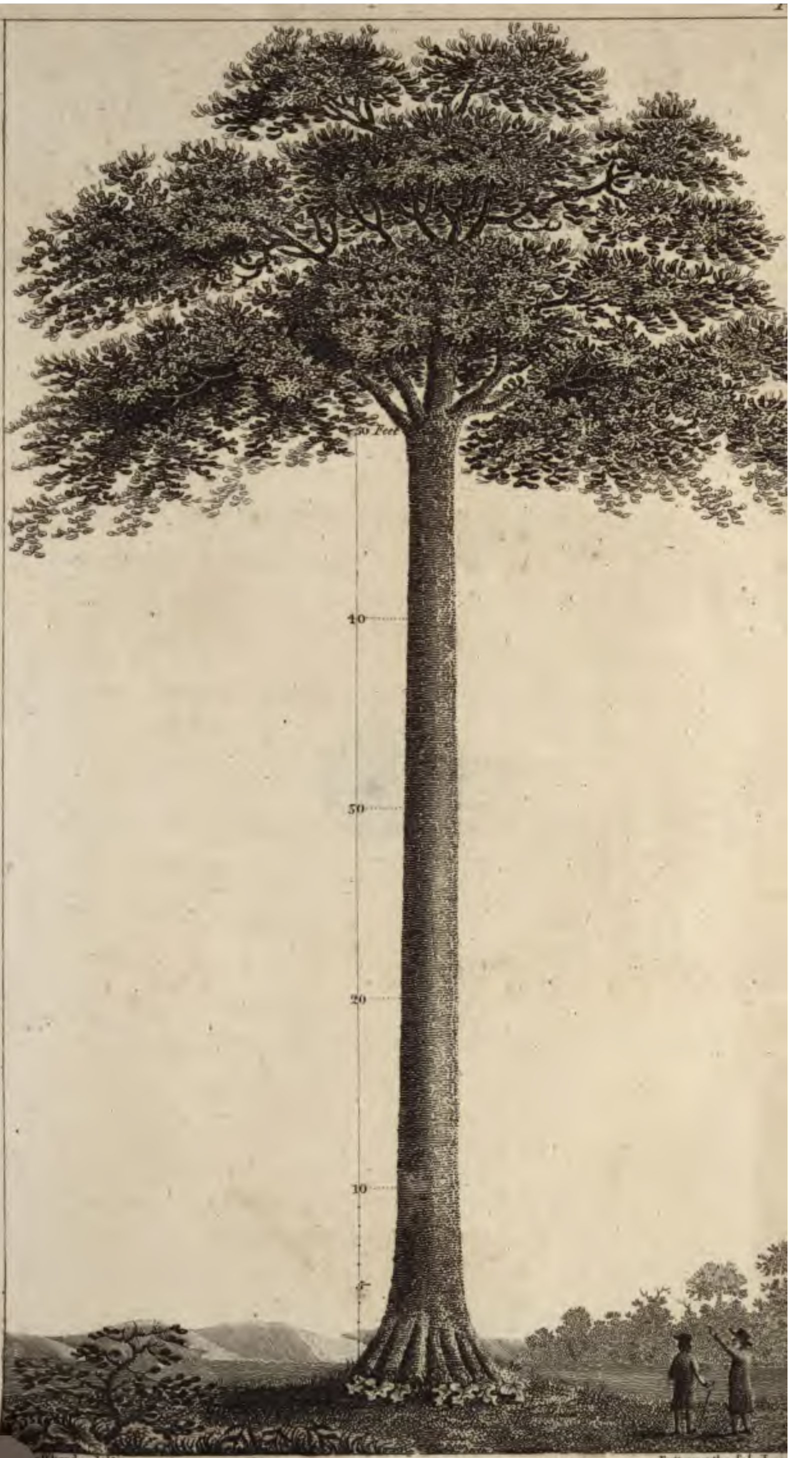

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The Woburn Beech.

THE
FOREST PRUNER;
OR,
TIMBER OWNER'S ASSISTANT:
A TREATISE ON THE TRAINING OR MANAGEMENT OF
BRITISH TIMBER TREES;
WHETHER INTENDED FOR
USE, ORNAMENT, OR SHELTER:
INCLUDING
AN EXPLANATION OF THE CAUSES
OF THEIR
GENERAL DISEASES AND DEFECTS,
WITH THE
MEANS OF PREVENTION, AND REMEDIES,
WHERE PRACTICABLE:
Also, an Examination of the Properties of
ENGLISH FIR TIMBER;
WITH REMARKS ON THE OLD AND OUTLINES
OF A NEW SYSTEM FOR
THE MANAGEMENT OF OAK WOODS.

BY
WILLIAM PONTEY,
Nurseryman and Ornamental Gardener, Author of the Profitable
Planter; and Planter and Forest Pruner to
THE LATE AND PRESENT DUKE OF BEDFORD.

THE SECOND EDITION.

LONDON PRINTED:
SOLD BY J. HARDING, 36, ST. JAMES'S STREET;
J. WHITE, FLEET STREET; AND J. MAWMAN, POULTRY.

1808

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TO THE SECOND EDITION.

In sending a Second Edition of this work into the world, the Author has great satisfaction in announcing the very favourable reception the first has met with: not so much because it may have served to gratify or benefit himself, as because it is a convincing proof that men are beginning to observe how defective the general management of Timber is, and hence are disposed to receive any information which has a tendency to improve it.

As care had been taken, in the first instance, not to disseminate crude opinions, so the increased experience of two years has presented the author with little that seemed to require correction, except a few inaccuracies, and some trifling errors of the press. The additions, which are chiefly explanatory, will be found among the notes;—had they been large, he should have thought it right to print them separate, to accommodate former purchasers; and should they ever become so, he means to pursue that course.

For the present, his leisure is almost exclusively devoted to the reprinting of The Profitable Planter, with large additions—which has been long promised, but much longer called for; and delayed, principally on account of the present work. If to furnish a book, no otherwise valuable than to *sell*, had been the height of the author's ambition, *that* might have been easily gratified long ago: but not such is the fact; he feels his Reputation and Interest equally concerned to produce what will be also *extensively useful.*

Under these impressions it is probable, that at some future period, he may give his ideas upon the Principles and Practice of *Ornamental* or *Landscape* gardening. At present, however, he has no leisure to do justice to his own ideas; nor, indeed, does the present moment seem the most favourable, as two authors, *great*, at least in pretensions, have lately volunteered their services, as teachers of this delightful science; and some time must elapse, before the public can be properly apprised of their *real merits.* If it should prove that, instead of *ascertaining* and *fixing* the Principles of the Art, they have merely talked about them; and that they have left the Practice, not only *unimproved* but *untouched*, then the public, sensible of such deficiencies, may be supposed duly to appreciate more substantial instructions.

Alike unknown to the Society of Arts and their secretary, the author thinks himself honoured in being enabled to publish the annexed documents.

Society of Arts, &c. Adelphi,
London, Oct. 30th. 1806.

SIR,

The Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to return you their thanks, for the present of your valuable and useful publication, called the FOREST PRUNER.

I have read it with great pleasure, and think it will be productive of very considerable advantages to all persons, who follow your instructions.

Your treatise is carefully deposited in the Society's Library, and has met with much attention. I am,

Sir,
Your obedient servant,
Charles Taylor, Sec.

Mr. William Pontey,
Huddersfield, Yorkshire.

Extract from the Preface to the 24th Vol. of the Transactions of the Society of Arts, &c. page 8, *published in Feb.* 1807.

"The mischief and damage arising to plantations in general, from a bad system of pruning, or neglect, induced the late public-spirited Duke of Bedford to direct a series of experiments to be made, at his expence, by W. Pontey, of Huddersfield, on his extensive plantations in the neighbourhood of Woburn. Mr. Pontey has shewn great industry and judgment in his selection of specimens, and in the clear detail relative to pruning Forest Trees, which he has communicated in a publication, entitled the Forest Pruner, presented by him to the Society."

"This system has been pursued by Mr. Salmon, agent to the present Duke of Bedford, under his Grace's auspices, and confirmed by his certificate, as noticed in the present volume. We are happy to add, it is continuing with spirit under his Grace's particular protection and attention."

TO HIS GRACE

THE DUKE OF BEDFORD.

MY LORD,

HOWEVER patronage may be made to serve unworthy purposes, it has frequently been beneficial, both to authors and the public, by stamping a consequence and currency upon what is, in itself, useful.—Had a doubt been entertained whether Rural Science required such an addition as the present performance, so far from your Grace's patronage being requested, the book itself would not have appeared.

How much the example and influence of your illustrious Brother and Predecessor added to the improvement of almost every branch of Rural Economy, the faithful pen of History will record;—nor will it be forgotten, that the improvement of Timber was an object of his solicitude.—To have been deputed, by him, to superintend that object, will always be considered, by myself, as the highest honour, and next to it, that of being continued by your Grace in the same appointment.

The example of a Character which will ever be dear to this kingdom and mankind, the situation of your own Timber trees,—your stake in the country, with the allowed distinction of being *the hereditary Patron of Rural Science*, all seem to claim, from your Grace, a steady perseverance in the honourable and beneficial path of improvement; as it must not only have a tendency to check the present increasing scarcity, but to shew what improvement Timber is capable of *generally;*—and, more *particularly, the real properties of that unjustly degraded part of it*—ENGLISH-GROWN FIRS.

I am, my Lord,

Your Grace's

Most obedient humble servant,

WILLIAM PONTEY.

Huddersfield,
Dec. 16, 1805.

PREFACE.

As the author has, for many years, devoted a great proportion of his time to investigating a branch of Rural Science, hitherto much neglected, though equally connected with individual and the National Interest, he thinks himself entitled to that protection which it would be injustice to refuse,—namely, not to be *inconsiderately* classed with a description of writers, who send books into the world, much better calculated for sale than use.

Presuming this to be granted, the reader is informed, in return, that if he expect the following sheets to be principally composed of Theories, or to furnish little more than his library can already afford, he will be equally disappointed. — In this, however, the writer takes no credit; for, so far from highly appreciaating the value of what he could gather from books, a part of the merit of his own (if such it have,) is in demonstrating the absurdity, the inutility, and even the baneful tendency of much which they furnish, under the imposing name of INSTRUCTIONS.

In one point of view, books have been useful; by giving an idea of what was known of the cultivation of Timber one or two centuries back; and thus exhibiting the lamentable imbecility of modern efforts to increase that knowledge.

If trees were, indeed, cast by Nature, in a mould, which it would be fruitless, if not impious, to attempt to alter, as some authors have gravely asserted, then might we say to Improvement, " Here shall thy proud efforts " be stayed."—The doctrine, however, betrays an extreme ignorance of the *natural* and *accidental* forms in which trees are every where found; as no link in the chain of nature appears more susceptible of improvement by Cultivation. Should, however, a doubt of this important fact remain, a glance at the Frontispiece, (the form of which tree has been improved by culture,) must effectually remove it.

The leading object of this performance has been to ascertain how far the progress of nature could be traced with *certainty*; so as to furnish an *unerring rule*, for improving the form, increasing the weight, and preventing the defects of Timber Trees. If this point have, fortunately, been established, there cannot be any great failure in the subordinate ones; as they are (technically speaking) no other than the branches of the same tree.

The Plates will, it is presumed, considerably facilitate the understanding of the subject.—To the Engravers, the ingenious Messrs. BUTTERWORTHS of Leeds, the author feels considerable obligations, for their masterly execution of the subjects, *supposed* natural, and their very striking and correct delineation of such as are *really* so.

In the execution of the work, the author has no other claims to superiority, than what have been afforded by industry, opportunity, and an uncommon degree of attachment to the subject, But simple means are not always the least effectual; and the country has much to regret, that no public proof has yet appeared, of similar means having been used by others.

The doubts, which rest upon the minds of most men, both in regard to the propriety of cultivating Timber, and the methods to be employed, are the best proofs of the necessity for investigation. On a subject of such importance, the uncertainty of public opinion is equally detrimental and disgraceful. It is against such uncertainty that the present effort is principally directed. If the author have furnished materials or evidence sufficient to distinguish between truth and error, he has done his duty; and, whatever may be the event, as to the present generation, posterity will remember the effort with gratitude.

THE

FOREST PRUNER.

THE present is an age of improvement: so says the concurrent testimony of every person of observation, who has attended to the recent and amazing advances in different sciences; such as Agriculture, Mechanics, Chemistry, &c. &c.—nor can we consider those objects without being struck with the astonishing powers of the human mind, when stimulated to pursue particular objects.—The genius and enterprising spirit of the present period, aided by liberal patronage, have, in numerous instances, effected what, in times past, would have been considered as the visionary schemes of a disordered imagination;—as matters improper to be attempted, because, in themselves, impossible.

In descending from general to particular objects, it is gratifying to notice the successful exertions which have, for several years, been made in the improvement of the soil.—AGRICULTURE, in *all* its branches, advances with rapid step, while an object so nearly allied to it as the improvement of TIMBER remains nearly, if not absolutely, stationary.—The objects of Horticulture too, (its other kindred science,) are studied with every possible degree of attention;—even our *Mushrooms* are tended with a *nurse's care*;—while the OAK, the pride of our woods, the chief material of our navy, and, consequently, the Bulwark of our Country, is left *to thrive or rot by chance*; unheeded, if not forgotten!

That the quantity of Timber, in this island, keeps constantly upon the decrease, is certainly a very old, and not less common observation, and such a one as, I think, no person of experience and observation will pretend to dispute; the rapid increase in the value of the article, and the large quantities imported, seem evidence sufficient to ascertain the fact. Nevertheless, of late, I have observed, with some degree of national pride, that such importation must, in a reasonable time, receive a considerable check, provided the exertions which have prevailed among our planters, be continued *; and followed up by the *necessary attention to* PRUNING.

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* It being an indisputable fact, that, for the last three or four years, Planting has increased astonishingly, in most parts of the united kingdom, we are authorized from thence to conclude, that the number of Timber Trees is increasing, will increase, and *never more (by the friends of Britain,) be materially diminished.*

To suppose, that, when a tree is established in the ground, the planter's care is ended, is an error equally common and pernicious; for it ought never to be forgotten, that a man may understand the *planting* of a tree, while he is totally ignorant of its *culture;* though both are essential to the planter's ultimate success. Indeed the former may now be said to be, in some degree, common;—every gardener knows something of it, and every planter more;—it is also found diffused in books, so far, as he that reads with attention, may be able to practise with some tolerable degree of success. But is that the case with the latter?—I apprehend not. Hence the necessity of investigating the subject; when it will probably appear, that the *scarcity* of such knowledge is, in a considerable degree, *the true cause of the scarcity of timber.* Certain it is, that nature has been abundantly bountiful to us, in regard to the production of Trees; and our wants call loudly upon us, to improve that bounty to the utmost:—therefore the inquiry is indeed important, *Where shall we find the much needed instruction?*

It is now many years since the subject struck my mind, in the manner above stated; the consequence of which was, that books were resorted to in the first place;—there, however, I experienced nothing but perplexity and disappointment; as scarcely any two of them agreed in one opinion. However, it soon was evident that little assistance was to be expected from that quarter, as no writer, that fell in my way, seemed to have studied the subject sufficiently to assign a satisfactory reason for his own practice. From books I naturally turned to men, (woodmen,) and with much the same sort of success. Their practice, it is true, did not materially contradict each other; but to me, at least, it seemed that they were all at variance with *Reason and Na-*

ture. The point indeed was soon so obvious, that, rejecting the two former sets of instructors, I had recourse to Reason and Nature only:—from which sources alone have been collected all I know, with any tolerable degree of certainty upon the subject.

However, though neither *Books* nor *Men* have been serviceable in elucidating, still it is confessed, they have thrown considerable difficulties in the way of discussing the subject. Mens minds are generally prejudiced in favour of old established opinions; assertion from one quarter is equal to the same sort of argument from another.—Therefore, before we can work conviction, we must resort to a better species of evidence; we must, in fact, show the reader, by reasoning from what he already knows, on which side the truth lies. The *Book* of *Nature* is open, and we must study it attentively; otherwise we shall in vain expect the intelligent part of mankind to study ours.

To say that the opinions and practices of the bulk of mankind, in regard to the training of timber, have been hitherto generally erroneous, may, and will, to many, appear a very bold assertion; and one for which we have no right to expect credit, except we can give some probable account of the cause, or causes, why it has so happened.—For it is not pretended but men are, in general, sufficiently ready to adopt what makes clearly and indisputably for their *Intereſt*, provided the matter stand fully demonstrated; which it muſt be confessed has not been the case. Indeed, it appears, that the persons who have treated the subject, had but very slight ideas of its importance. Generally content with detailing old opinions, without examining their tendency, they have, hitherto, done little more than unsettle men's minds, not only as to the method, but the expediency of *Pruning* at all. We adduce a few examples.

Evelyn, the honest and eloquent advocate of planting, whose name can never be mentioned without the highest degree of respest, by any man who is attached to its interests, falls unluckily into the general error; for though he extols Pruning highly, he is sometimes contradictory, and treats it in the detail too generally and loosely.

It is of little use to tell a man totally ignorant of such subjects, that it "is by the " discreet leaving the Side Boughs in con- " venient places, sparing the smaller, and " taking away the bigger, that you may ad- " vance a tree to what determined height " you desire," (which is by far the best hint I have found in him or any author upon the subject;) as he advances no reason upon which it is founded. Indeed, if he had been aware of the reason for leaving the side-branches, he could not have inserted what immediately follows; he says, "Thus bring up the leader, and "when you would have that spread and "break out, *cut off all the side boughs*, and "especially at midsummer, if you espy "them breaking out*." Here we have a sudden change of system, without any cause assigned, except that of making the top of the tree "spread and break out;" which to a man of experience, appears the worst that could have been given; as he well knows, that nature performs that operation much better, without such interference; and he knows, besides, that its immediate visible tendency would be, to create a necessity for the extra Midsummer-Pruning there mentioned, with other subsequent ones:—a very important consideration; for, if the business cannot be done without such attention, it will rarely be done at all.

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* Hunter's Evelyn's Silva, p. 473.

We shall not here point out the *concealed* bad tendency of the method, as that will come in, more properly, elsewhere; but we may remark generally, however, that such directions, from such an author, could not fail to do immense mischief; for, as has been before intimated, if it were discovered that Evelyn had not hit upon a practicable and desirable method of training timber, it was natural to infer the matter impracticable in itself, and hence generally neglected.

It has been on all hands allowed, that, as the advocate of planting, he was singularly successful. How much has his country to regret that he was not the same in regard to pruning; as, in that case, the benefit must have been immense. The different results may, however, be very naturally accounted for: —the former required only such arguments as any man of abilities and observation might furnish;—the latter, a degree of experience, perfectly incompatible with his very numerous avocations.—That he erred, sometimes, creates no surprise; but that he erred so seldom, is truly astonishing.

It is highly probable, that, when writing upon the foregoing subject, Evelyn was influenced by the opinion of Lawson, who wrote above two hundred years ago, and whom he quotes, at some length, with great commendation. Indeed, if Lawson's knowledge had been equal to his zeal, the whole would have been well applied.—We have, however, to observe, that the very title of his book, *(A New Orchard and Garden,)* implies that Forest Trees were by no means a leading object with him; and his manner of treating the subject speaks still more decidedly to the point; for his directions, in regard to pruning *fruit trees* show clearly he had studied *that* subject; but his method of training forest trees convinces us, that he had no experience in *that* branch.—His observations, however, upon the state of the *Woods*, and *Timber Trees*, at *that* time, were, no doubt, just, and unfortunately apply but too closely to what they are *now*.——Two hundred years is a long, very long period. *They* are past; and, in all that time, no improvement has been made in the Woodman's art! The fact is incontrovertible, let the disgrace rest where it may.

It should seem, that from the year 1662, when Evelyn wrote his "Silva," to 1776, when Dr. Hunter republished it, with notes, nothing had appeared upon *pruning*, which attracted any considerable degree of public attention: for had it been so, the latter would scarcely have suffered such an important part of the subject to pass over without any note whatever.

We do not know whether this edition of the "Silva" preceded or followed the book we have next to notice, as they both issued from the same press, in the same year, namely, *A Treatise on Planting, Gardening, &c. by J. Kennedy, Gardener to Sir Thomas Gascoigne, Baronet.* The author tells us, in his preface, "the "instructions there given are the result "of many years' experience;" which, probably, may be very true, so far as applying to any thing done within the garden walls; but beyond them, we find no documents sufficient to warrant the assertion. For though experience does not always lead men into the best methods, yet it will always enable them to correct gross mistakes.

Suppose, for instance, we have trees planted six feet apart, and afterwards add an equal number to them, a person of no experience would suppose they would then stand at the distance of three feet; or that each tree would occupy nine feet of surface. Suppose again, we have trees planted at three feet distance, and half of them thinned out; a person of the same stamp would suppose the remainder then to stand at six feet distance, or that each would occupy thirty-six feet of surface; when in fact, the quantity, in both cases, would be just the same, namely a surface of eighteen feet.——Such mistakes, however, experience never fails to correct: it is quite sufficient that a man shall once in his life have either to plant or prune, in the ways mentioned, or any other, where the distances do not materially differ, and he will find the result so far contradict his theory, that he will be set right; and it is *next to impossible*, he should ever afterwards forget it.

Both these errors, our author has not only fallen into, but persisted in. We have noticed them in p. 6, 7, 36, 37, 97, and 110, where they are asserted as facts, and followed by a corresponding chain of reasoning;—but, the asserted facts are false, consequently the reasoning is without foundation.

It would be easy to add proofs in abundance, that, beyond *garden practice*, our author had no experience; as within such limit all is consistent; beyond it, every thing the reverse. For instance, though he directs a tolerable method of pruning forest trees, while they are very small, yet for want of experience he supposes *that method* would be attended with the necessity of a midsummer-dressing, which certainly would not be the case. He supposes, on the whole, that such trees would require *two* prunings *every* year, when *one in two years* would be quite enough. Indeed, it is sufficiently plain that he was afraid of meddling with trees somewhat large; as, in such cases, he recommends pruning either by leaving *snags*, or by leaving trees to *prune themselves*; he says, "*Firs at* "*ten feet apart will do so:*"—and all this we are to consider as *experience!* The poet had an eye to something of the sort, when he said,

> "A little learning is a dangerous thing."

We next come to the celebrated author of *Observations on the Diseases, Defects, and Injuries of all Kinds of Fruit and Forest trees; with an Account of a particular Mode of Cure;*—whose book, it is. true, has raised high expectations among a certain description of persons. Its title, as well as the table of contents, gives us reason to hope for important information, in regard to the Pruning of Forest Trees; but, when we come to the point, "*'tis disappointment all.*"—He tells us, indeed, much of his good wishes to the subject, and drops some loose hints, in regard to what has been the opinions and practice of others; and sees, or thinks he sees, destruction lurk behind, as the natural consequence of them all, mean time he seems very shy in giving his own. Ultimately it comes out, that,—"as a most "efficacious remedy to prevent the evils "that I have described, with all their de-"structive consequences, and to restore "sound timber, where the symptoms of "decay are already apparent, I confi-"dently recommend the use of my Com-"position," &c. &c.—being part of a string of bold assertions, unsupported by any thing like the shadow of proof, but all tending to make his book *appear* necessary to thousands, at the same time tacitly denying the existence of what any one may see who will look, namely, the astonishing and successful exertions of *simple nature*, in healing the wounds of trees. On such a conduct we may observe, (for we cannot do less,) that if the writer really knew no better, his meddling with the subject was highly presumptuous; but if the reverse, completely unjustifiable.

Should any one object to the foregoing observations, as ill-naturedly pointed or unnecessary, to such we would observe, that respect for the ashes of the dead cannot justify us in sacrificing the interests of the living, and, with them, our own integrity. The advocate of *Truth* and *Nature* is bound at once to oppose, and expose, every doctrine which intrenches upon their just prerogatives; because he is sure it is for the interest of the present, as well as future ages, to have "the truth, "the whole truth, and nothing but the "truth," laid before them.

The substance of what Mr. Forsyth has advanced, in regard to pruning forest trees, is briefly this:—No wound can be healed, effectually, except it be dressed with his composition. A sort of reasoning highly detrimental to the interests of timber owners; as no one that believes him will care to prune a single tree, much more a great number; the *remedy* being abundantly worse than the *disease.*

Here the following question naturally presents itself: *Can forest trees be pruned without damaging the timber?*—which may be satisfactorily solved, by considering, how it comes to pass that we have *any clean sound* timber at all.—Nature, unassisted, certainly produces none of the former; and according to Mr. Forsyth, we can have none of the latter without using his composition; whilst facts prove we have a large quantity of both. Consequently, we may safely assert, in contradiction to all such cobweb arguments, *that we are indebted to pruning, of some sort, for all the clean timber we have;* and that it is a safe operation, if properly performed.

Much has been said concerning the efficacy of the composition, that is truly wonderful; language has been ransacked to extol its merits, while of the *thing itself* we have nothing certain. In the first place, we are directed to use no less than five ingredients, in certain proportions, without the addition of any liquid; then, in order to keep it moist and preserve its efficacy, we are directed to keep it covered with "urine of any kind;" afterwards we are directed to "use it in a liquid state, or about the consistency of thick paint," by mixing it with urine and soap suds: still we are not told what kind of urine is to be used.

But after amusing his readers for twelve years, with accounts of the merits of his discovery; in the Postcript to the Third Edition, the author informs the reader of *another discovery*, which, he says, he has "recently made; and which, as "being calculated to save time and labour, may deserve attention." (It would certainly have saved much of both, had he always been as considerate.)

He then goes on to inform us, in substance, that most of the labour hitherto bestowed in executing his directions, was *labour in vain*; that the soap suds are *useless;* the sand *unserviceable;* the lime-rubbish *a nuisance;* and both sorts of ashes merely *capita mortua:* and therefore the whole of these articles are quietly dismissed the service, and sent (pauper-like) to their proper settlement, the *dunghill:* and thus we have five of the seven of his wonder-workers sacrificed, at once, upon the altar of truth, while two only remain,—the sad memorials of the ruthless deed*!!

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* "I also avail myself of this opportunity," (says Mr. Forsyth) "to add a discovery which I have re-
"cently made; and which, as being calculated to
"save time and labour, may deserve attention.

"Instead of paring away the bark, as had hereto-
"fore been the practice, and covering the stem with
"the composition; I now merely ſcrape off the loose

Seriously, he has left nothing in the composition capable of producing the effects ascribed to it; for whatever may be the virtues of cow-dung and urine*, still the manner of application precludes them from operating to any beneficial purpose; as the first or second heavy shower of rain must inevitably displace them completely, when laid on of the consistence of

" bark, and apply a mixture of *cow-dung and urine* " *only*, (made to the consistence of a thick paint) " with a painter's brush, covering the stem carefully " over. This softens the old scabrous bark, which " peels off during the following winter and spring, " and is succeeded by a fine smooth new bark." On which we need only to remark generally, that if such astonishing effects may really be produced by such trifling means in this case, it would be similar in any other; and therefore, all the extra means " *heretofore*" *used*, were perfectly *useless*.

* In the Preface to the First Edition, the author mentions Cow-Dung, as an article applied by others to the same purpose; and by himself " but with very " little success."

paint, as directed; and yet we are taught to believe, that this far-famed composition, "when applied to Fruit Trees, has "prevented further decay, excluded wet "and moisture, restored vegetation, and "increased fruitfulness, in such as were, "apparently, barren and decayed.

"When applied to Forest Trees, it "has restored them to soundness of timber and healthful vegetation; covering, as it were, visible nakedness and "increasing decay, with fresh and vigorous foliage:—It is of a soft and "healing nature; possesses an absorbent "and adhesive quality; and, by resisting the force of washing rains, the contractions of nipping frosts, and the "effects of a warm sun or drying winds, "excludes the pernicious influence of "a changeable atmosphere*."—In fine, the author expresses his belief, that

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* Second Edition, p.418—419.

" the discovery he has made and divulged to the public, will facilitate the " good intentions of planters, to the " essential advantage of the British empire."

Indeed, as the author modestly asserts, that the composition " seems to have the " same effect on trees as a top-dressing of " dung has on land*;" we have nothing left to be surprised at, but the astonishing stupidity of persons of his own profession, who are found, almost to a man, so extremely faithless, that they never willingly adopt his practice; nor does it appear,

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[*] *Preface to the First Edition.*——Upwards of thirty years ago, Baron Vanhake invented and advertised a composition, a few pounds of which was to fertilize, or act as a dunging for, an acre of land; but after making a noise for a short time, and raising high expectations among the credulous, it suddenly fell into disgrace for *a very trifling fault.*——It was found to be useless.——The reader will make his own application.

that one solitary individual of them has as yet come forward, to certify a conviction of the usefulness of the composition.

Under all the circumstances of the case, some persons may think the author's success (his principal certificate being above suspicion,*) exceedingly difficult to account for. It is admitted that such certificate proves that *appearances* were, in every respect, as there described; but it certainly has not proved by what means they came to be so.—The application of a plaister, and the healing of a wound, do not go the length of proving that such plaister effected the cure.

But while we admit such certificate to be above suspicion; and likewise, that it bears evident marks of both the integrity and industry of the "very honourable persons" who have signed it; still, we can never admit, with the author, "that they "were selected as being the most competent judges of the subject that could be "named in the kingdom*"—because the document itself furnishes evident and abundant proof, that they were by no means conversant with the subject; and therefore could not possibly distinguish, between appearances *extremely common* and such as were *extraordinary*: indeed, we do not find an attempt to discriminate between them. On the contrary, in every part, they seem to consider all the favourable appearances exhibited, as entirely of the latter sort.

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* Second Edition, page 449.

In speaking of forest trees that had been cut down, they tell us, "the uniform result of these experiments appeared, that *those stems to which the* "*Composition had been applied*, had shot

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* Preface to second Edition.

"up into healthy, vigorous trees, in far "less time than they could have conceived possible; while those left to unassisted nature, had only produced irregular, unhealthy shoots, and were "apparently in a state of decay." On which we may shortly observe, that the gardener, the woodman, and even the hedger, well know, that such trees cut down (though left to "*unassisted nature*") seldom fail to shoot up most rapidly afterwards; and they know, also, that when they do not, it is occasioned by either a defect in the root, the soil, or *maltreatment.*

What had *happened* to the trees that produced only "irregular, unhealthy shoots," we know not; but we know many WAYS* of producing such appearances, upon trees whose roots are otherwise in a healthy state, with little trouble, and without the assistance of a second person: and it is impossible to mistake in regard to the *good purpose* such a *striking* contrast was intended to serve. In fact, the only UNCOMMON APPEARANCE here, is, the state of these unhealthy, decaying trees.

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* If it be asked what such WAYS are; the answer is, they are already known; (perhaps too well,) among Gardeners, and we do not choose to instruct mankind in the means of doing private mischief.

That " a tree cut down to the stump," produces another, which at " six, seven, " or eight years growth, attains to a " size and height which trees sown, or " planted, seldom attain to in thrice the " time," is a fact extremely well known; our reporters, however, attribute it to the efficacy of the composition only; and they do the same in regard to the quality of the wood, formed in and upon the wounds of trees, when in a healing state; they say, " we cut pieces of it out, " and compared them with other pieces " cut out of the original wood of the

"same trees; and after as accurate a
" secreting and comparison as we were
" enabled to make, we could not disco-
" ver any difference either in the colour
" or texture:" but certainly there is nothing UNCOMMON in such an appearance; *for it could not be otherwise*, unless the composition had suspended the common operations of nature, and introduced in their stead, *methods of its own.* In short, the above, with other previous and subsequent remarks, furnish abundant proof of our first position, viz. that the reporters were by no means conversant with the subject; and hence, with the best possible intentions, they have been led to impute effects to wrong causes; consequently the operations of nature are degraded, in proportion as the merits of the composition are exalted.

For the truth of the above observations, we seriously appeal to the experience of every person who has devoted much time to the subject; and to such as cannot be biassed by the opinions of others, we would say, form your own, by carefully observing nature's "*unassisted operations*" in any wood, two or three years after it has been fallen. There you may see, not only how rapidly new trees rise from old stumps, where the soil is tolerably good, and proper attention paid to displacing superfluous shoots; but likewise what astonishing exertions the same POWER makes in healing wounds, whether occasioned by branches taken off, (provided they are cut close,) or by the drawing or dragging out the timber. In the latter business, many a ghastly scar is inflicted, and yet they heal unnoticed; indeed it is the facility with which the operation is attended, that occasions it to be so little observed and known. In the subsequent pages, we shall have to treat somewhat largely upon the nature of wounds in forest trees; when, we trust, it will appear to every unprejudiced mind, that they are a part of the creation which can very seldom be benefited by means of Quackery*.

The *powers* of nature being thus *impressed* into the service, he then, very consistently, puts the *practices* of the trade into *requisition*, by representing himself (in many parts of his book, but more particularly under the head "Pears") as the inventor of cutting down fruit trees, in order to renew their strength and fruitfulness; with how much truth, gardeners and nurserymen can easily tell us. If such discoveries are to pass

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* It will be observed, the foregoing observations relate chiefly to forest trees, as my present business is with them.—We may remark, however, in regard to fruit trees, that much of the same sort of reasoning will apply; though it is obvious that the writer we have quoted understood the culture of the latter much better than that of the former; still his merits, in regard to them, seem to hinge upon one circumstance:—he had attentively observed what "unassisted nature" could do, provided obstructions were removed out of her way; and these efforts, by a happy sort of dexterity, he all along exhibits as the effects of his composition.

As we do not conceive it necessary to notice the opinions of any other writers than such as are, in some degree, popular, and who may be supposed to have influence with the public, we shall have to produce only another authority, viz. Nicol, the author of—*The Practical Planter, comprehending the Culture and Management of Planted and Natural Tim-*

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for NEW, we shall expect, by and by, some dashing genius to CLAIM that excellent invention—the Planting of *Cabbages.*

Taking the whole together, I presume a very natural answer is furnished to a very proper question, which has often been asked, viz. Why were not professional men employed to report upon the merits of Mr. Forsyth's discovery?—the answer to which is, that such, having professional reputation at stake, must have been under the necessity of tracing effects up to their TRUE causes; they must have known what was *old* or *common* both in nature and practice; and therefore could not possibly have suffered the author to avail himself of it as matter of *New Discovery.*

ber, in every Stage of its Growth.—How WELL experience and observation had qualified him to perform the task thus imposed upon himself, the following specimen will in some measure evince.

He says, "It can never be proper to "lop the branch of a Fir tree by the bole. "From the resinous juice which follows "the tool at any season of the year, all "wounds become, and continue to be, "blemishes. When it becomes neces-"sary to remove a branch that is doing "injury to plants around it, the best me-"thod is to shorten it back to the last "pair of laterals or wings; the remain-"ing part will soon decay, rot, and drop "off."*

How soon it would decay, or how far such decay would affect the tree in growth, or the timber afterwards, or how such means were to remove the principal defect of English Fir Timber, namely KNOTTINESS, we are not told; neither has he brought one single argument, or fact, in support of his *notable assertion*, that "*all wounds upon the bole, inflicted at any* "*season, become, and continue to be, ble*-"*mishes.*"

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* Nichol's Practical Planter, Page 213.

As we shall have an opportunity of examining the tendency of the very extraordinary sort of *management* here recommended, we may pass it over for the present, with generally remarking, that such instructors are like Job's comforters; finding us in a bad situation, they console, by assuring us it is hopeless. It is for the reader to judge how much we benefit by such consolations.

The above information, however, is equally *valuable* with the author's discovery of a new method of growing bends for ship timber; which is, to cut off the head and all the side branches of a tree but one, which he converts into a leader, not doubting that, in time, it will become a capital *bend*, for the ribs of a ship. Thus, in his *rage* for *bends*, he evidently supposes that the course of nature will *bend* to establish his theory:—but not so, friend Nichol; she will certainly keep her own track, which is, constantly to *bend* her course towards the perpendicular; and, therefore, long before a scantling would be produced large enough for the purpose, the *bend* would disappear; except a small curve at the base.

His general method of pruning deciduous trees is equally *new* and *curious*. (It is just the reverse of Lawson's. He directs us to cut off all the side branches; Nichol, none:) and only wants the trifling epithet USEFUL, to complete the climax. The sum and substance of it, in his own words, is this: "Nor is it necessary to "exercise the knife *much*, or lop a single branch by the bole, unless decayed, or broke by accident; all that is "*necessary*" (the reader will mark the expression,) "is shortening strong branches, "such as in any considerable degree "seem to cope with the stem. And this "must be persevered in, so long as the "intention is to produce *straight timber**." He does not use the word *clean*, and there seems peculiar propriety in the omission, as the method he has pointed out, though tedious in the extreme, would never teach us how to produce a *foot* of the article; and, as to *length* of stem, we find no instructions how to obtain so desirable a property, except shortening the branches, and then leaving them to "*decay*, *rot*, and *drop off*," deserves the name.

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* Page 199.

Of plaistering and smoothing wounds, our author is a decided advocate, yet we will venture to assert, that whoever follows his directions on this head implicitly, must spend much *good Time* and *Tar* in vain.

The detailed consequences of such methods will be considered in their proper places, our object here, being chiefly to exhibit the discordant opinions of different authors.

From the foregoing we gather, that the opinions of writers upon the subject, to a very late period, may rather be said to be founded on floating ideas than on fixed principles; and that such must rather retard than forward the business of improvement. We shall leave them for the present, and advert briefly to the importance of the subject.

That the good *husbandry* of timber is an object of *national*, as well as individual importance, cannot be doubted. The ways in which it contributes to our comforts and convenience are so many, that it would be equally impossible and useless to recount them. While considered merely as an article of property, it is difficult to say, what other species keeps so constantly upon the advance, in value; independent of the increase, in quantity. Considered in another light, trees give a particular sort of dignity, or consequence to an estate; such as are *well wooded* rarely missing to find purchasers: which proves that, as matter of ornament, their value is incalculable. A single tree may be highly valuable in a threefold point of view, namely, for *shelter*, *ornament*, and *use*. And it happens not unfrequently that, in particular situations, its *ideal* may exceed its *real* value, in a tenfold degree. In fact, *taste*, which may be said to be founded only upon the fashion of the day, in many things, is always, in a great measure, stationary in regard to trees; as we find very few persons indeed who do not feel pleased with them; many, it is true, without knowing why; and therefore we may venture to assert, that taste, in this instance, is founded upon reason and nature.

If such then be the uses and importance of trees, surely their culture deserves our best attention. If, by expending a few pence, we could cause an *oak stump* to produce more and better timber in twenty-five years, than it would otherwise do in forty; and if, by slight attention, we could not only increase the stature, but improve the form of trees in general, and prevent the premature decay of a great proportion of the finest oaks in the kingdom, it would be admitted that some good was likely to be done.

The importance of the subject will appear in a still more striking point of view, by considering the present state of our timber, its common *defects*, with their *causes*, and *consequences*, in the following order: generally reserving, to prevent repetition, the method of management applicable to each, to be treated upon under the general head of *Pruning*.

1. Knottiness.
2. Rottenness and hollowness.
3. Withered or decayed tops.
4. Short stems, with thick branching heads.
5. Shaken timber, or wind shakes.
6. Trees ivy bound, &c.

To assist the reader in understanding what we shall advance under the foregoing heads, it will be necessary previously to explain, in some degree, the course of the sap, or the manner in which a tree is fed and increased. A great deal of discussion has taken place among philosophers, about the motion of the sap generally, and still some difference of opinion prevails; yet, I conceive, that part of the subject, which more particularly applies to the present purpose, is so far obvious, that the attentive observer may sufficiently satisfy himself on that head.

If a tree were principally fed either by the means of vessels in the wood or pith, or both, (as some have contended,) the bark might be taken off without materially injuring it; a circumstance that never happens. On the contrary, one so treated, always appears in a languid state afterwards, if death be not the immediate consequence: this may happen sooner or later, according to the vigour of the tree, the hardness or softness of its wood, its situation as to moisture, and the season of the year when the bark is taken off; but we do not recollect a single instance where a perfect recovery has been effected, whether left to nature, or means were used, which might be supposed to assist its operations.

That the principal current, or course of the sap is immediately under the bark, or between it and the wood, seems obvious, from the appearance which *always* follows the taking off a branch close to the stem, either in or before the growing season; for, soon after *that* commences, a ring or swell may be observed round the wound, by some called a cicatrice, which is no other than the ends of the sap-vessels that fed the branch, sealed up, as it were, by a COMPOSITION, superior both in quality and mode of application, to any the art of man ever *did* or ever *can* invent.

Another proof of the point in hand is, that some time after such branch has been taken off, if the tree be vigorous, we frequently may observe a trifling swell above the part, the old bark being crack-ed, and a new one (of a lighter texture) appearing to grow under it; which is evidently occasioned by the extra quantity of sap, which used to feed the branch ascending in that direction.

One of the bad consequences that usually follow the taking off a branch in a different manner from that just mentioned, is a proof in support of the present argument. The inequalities or furrows on the trunks of trees, (by the carpenters called TROUGHS,) are occasioned by leaving stumps or snags, in that operation. In such a case, if the stump do not produce a branch, it dies; and, consequently, obstructs and diverts the current of the sap to both sides of it, so that, ultimately, a furrow is formed, deepest and widest at its base, and decreasing gradually upwards, till it disappear. Sometimes we find a hollow, somewhat similar under the branch, and both are undoubtedly occasioned by the same cause, namely, by the sap being diminished in one part, and the quantity increased in another: which shows not only the situation of the principal current of the sap, but likewise that the surface of the stem is enlarged in proportion to its quantity.

It would be easy to multiply proofs, were they necessary; but as this is not the case, we shall produce only another for the present, namely, the common operation of plashing or laying hedges. By this operation, the whole plant is made to lie in a sloping direction; often nearly flat, in consequence of a deep cut, which separates almost the whole of the wood, and more than half the bark; yet such plants are found not only to grow, but thrive afterwards, which could not have happened, except the doctrine now asserted were true.

Knottiness in timber is an *evil* of immense magnitude, and may justly be considered as the baneful source of nearly all the other defects, common to that article. And yet how little are their causes and consequences attended to; though it may truly be said, that, for want of such attention, the greater part of it is retarded in growth, and misapplied in use; and not only so, but its premature decay is much oftener to be imputed to this circumstance than the *soil*, though *it* has always been the standing idea, the *cuckoo-song of all ages*.

The causes of knots may be shortly explained:—Every tree, by nature, produces branches, and the base of every one of these is a knot; which annually increases in size, as long as it continues to grow upon the tree. Their uses will be developed as we go along.—The above we call *natural knots*. There are others, which we choose to call *unnatural;* because they are the effect of mismanagement. These will also be noticed in their proper place.

To prove that knottiness, or superfluous branches, retard the growth of timber, we may suppose a tree, with a considerable number of large branches, such as fig. 1, and contrast it with fig. 2, on plate II.—Taking it for granted, circumstances are equal, so far as soil, age, and situation are concerned; let us consider how much larger a quantity of leaves, and small wood, the one has to support than the other.—A moderate portion of both is necessary to the free growth of every tree; but we think it will be admitted, that such a figure as the latter would be deficient in neither; and, if so, then all that the former has to support beyond that quantity, is as so much sap deducted from what ought to go to the support, or rather the INCREASE OF

THE TRUNK. It certainly then must be obvious, that the one, with the same means must increase much faster, both in height, (generally,) and thickness of trunk than the other.

Knots are also the principal cause of the stems of trees growing much tapered; and every workman knows something of the immense loss and waste occasioned by that circumstance. We need spend but little time in proving this point, as the form of any tree of considerable age, that grows with one principal leader, and has long had a clean stem, demonstrates all we assert; as such stems, from a little above the base to the part where the branches break out, are never found to taper more than what is occasioned by the lower part being oldest; while, from the top of them upwards, the leader decreases in thickness, in proportion to the number of branches produced upon it.

Further. Knots not only retard the growth of timber, in the ways just mentioned, but also by obstructing the sap. —A little reflection must convince us, that it is impossible, either plant or animal, whose juices are obstructed, can advance as fast in size, as one which has free circulation.

Where the timber is knotty, the grain or veins both of the wood and bark are found curving in different directions. This, however, would do little harm to the ascent of the sap, were it not that it occasions a contraction in the vessels.—If the grain be finer, the sap-vessels must of course be smaller.—We may be certain of the fact, though we cannot see them.

It is true, that while a tree is young and vigorous, (which is in effect saying, while it has a plentiful supply of sap,) its quantity may be such, as to act with a force sufficient to keep the vessels moderately open, in all the parts of the tree; in which case, it will be found in a tolerably growing state. But this is not all we have a right to expect from a tree, in a good soil, and properly treated; for, in these, as well as in men, youth is the season for exertion: and if we cannot make the former thrive apace at that period, it is seldom in our power to do so afterwards, otherwise than by cutting them down, and beginning the business afresh.

Reasoning from causes to effects, it must be obvious that such thriving can never be expected, while the sap is either too little in quantity, or is obstructed in its ascent; and still less, when both evils co-operate. They may be called distinct evils, though occasioned by the same cause, namely suffering the tree to retain too many branches.

The situation of such branches will make a considerable difference, as to the quantity of obstruction. When several large ones are placed at or about the same height, and so as nearly to inclose the stem, it is obvious, that they must so far obstruct the sap, that the principal leader will have only a small proportion, and consequently can grow but slowly; though in young trees, and in soft woods, the damage will be trifling, in comparison of that where the case is reversed*.

Having seen that a tree, tolerably free from knots, is likely to give us the greatest general height and thickness, the deduction is plain, it must give us likewise the greatest length of stem: and all will admit *that* to be an essential point in the value of timber, as it is usually accompanied with the property of cleanness, or being free from knots. When that is the case, we say, a piece of timber is strong ; and it is observable, that great lengths are seldom used at once, but where considerable strength is required. When the knots are large, the wood cannot be strong.

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* The sap-vessels in firs, are larger than in any other wood we have noticed; a circumstance that seems to account for their heads growing freely, though their stems are beset with very numerous branches.

The difference in value between a clean length of thirty feet, and another of eight, the scantlings being the same, will be very considerable to the carpenter, foot for foot, in two points of view. The former being applicable to so many more purposes than the latter, renders so much less stock necessary. He may likewise use all the former, without incurring any more waste, than he would do in using the latter :—it is only the latter part that admits of any.——Besides knots divert the grain of the wood in a greater or less degree, according to their size.

If any beam under a floor, intended to support great weight, has large knots in it, it very probably will break, some time or other, at one of them. We frequently see beams of large scantlings, put into such places, in order to give strength; which, upon examination, may be found not half so strong, as if tolerably free from them. A large knot near the centre, is an extremely dangerous circumstance; as *there* the pressure will of course be greatest. Often, however, we find two, three, and even four such knots, in foreign Fir timber, and these placed opposite to each other; every one of which increases the danger of breaking*.

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* Where the beam is so large as to take the whole thickness of a fir log, whose branches have grown in annual sets, or opposite to each other, as is the case with foreign red deal, all such logs produced from the higher parts of the tree, are extremely liable to this sort of defect. To put such in places where much strength is required, is one of the worst species of deception.

I might here remark, by the way, that there is an art in the application of, or the manner of placing, knotty timber. The same piece may be much stronger in some positions than it would be in others: the rule is, always to lay that part downwards which has the most of, or approaches nearest to, a straight grain. A piece of clean wood cannot crack till it be considerably bended ;—one that is curled, cracks almost as soon as bent, I mention these things here, because, if known, they seem little attended to by workmen.——If, indeed, we would avoid the numerous evils that knotty timber subjects us to, we must add one more condition, to the two generally required in bargains, namely, *strength*, to scantling and soundness; for, it is true, that whether the beam of a warehouse, the axletree of a cart, or the shafts of a carriage, break; still, in at least nine cases in ten, the accident is to be attributed to knots;—they break the grain of the wood or cause it to be what is called *cross-grained*, in cases innumerable, where they do not appear.

By some persons, the treating of the defects of foreign Fir timber will be considered as an unnecessary task; for, no doubt, so long as we want it, so long must we take it "with all its imperfections on its head." We cannot improve *it*; and so far the case is hopeless; but this suggests some very important queries, such as these: What are the real or supposed defects of our own? and, Cannot they be managed, so as to be a substitute for it?—Probably, there can be no impropriety in examining the matter *here*, as it is presumed, their principal, or only *natural* defect, will prove to be no other than *that* under consideration; namely, knottiness. The reasons for such opinion follow of course.

We know that, with vegetables as well as animals, a certain degree of age is generally necessary, before they come to what is called maturity; or, in other words, before they become possessed of the properties, for which they are deemed the most valuable:—Timber for instance, with the exception of the Fir tribe, is a case in point, as almost every carpenter knows, at first sight, for what purpose most of the other sorts and scantlings of our own growth are proper. The experience of revolving ages has reduced the matter to so much certainty, that if he err in respect to their application, he will be considered as a person unacquainted with the common maxims or rules of his profession,—while, with regard to British Fir Timber, no such maxims or rules exist, and therefore he can proceed only by guess; and in so doing it is almost certain that, in some degree or other, the article will have injustice done to it.

That the prejudices against such Timber are strong, and almost universally prevalent, is readily admitted, and at first sight it seems natural to suppose they must be well founded; though in fact, they rest upon no better foundation, than the prejudice that prevailed less than a century ago, against Foreign Fir Timber, namely, a prejudice, the effect of inexperience. At that time, no workman could be found credulous enough to suppose that a roof made of it, would answer the purpose as well as one made of Oak, and yet, *now*, the tide of opinion is completely turned.—An article, which apparently has but little of either strength or durability, is found by experience, to possess a very extraordinary degree of both.

But while we admit that such timber possesses these properties, it must be allowed, that the article has had every possible degree of justice done it; no one ever suspected the young, small Timber equal in quality to the old; therefore, *that* only is used, where much of strength or durability is required; while in regard to British Firs, in the south part of the island at least, we rarely see any used but what are at once young and small. The absurdity of using *saplings* of any sort, (Firs excepted,) where durable Timber is required, every one will admit, by why *they* should not be entitled to the same allowances as other *saplings*, has not hitherto appeared.

To be consistent, we should consider that a Fir, planted in a suitable soil, increases very fast in size, and therefore, for some time, the Wood must be less hard and dense, than such as grow slower; of course, to expect it good in such a stage of growth, is highly unreasonable; the general law of nature, which admits of but few exceptions, certainly does not warrant such expectation.

In pursuing the present examination, it will not be attempted to show the different properties of each sort of Firs, as opposed to each other; probably, a long life would scarcely be sufficient to fully investigate the subject; nor can we be certain that much good would result from it; as sufficient facts have been collected, to enable us to state with confidence, that all the sorts most commonly cultivated in the island would be GOOD TIMBER, provided they were properly trained, and grown to a competent age.

The sorts just alluded to, are the Scotch, the Common Spruce, the Black and White American Spruce, the Silver, and the Weymouth Pine. The Balm of Gilead Fir is not included in the list, because whatever be its properties, it seldom lives long enough to grow to any tolerable scantling; and the Larch having several valuable properties, peculiar to itself, entitles it to be considered as a separate article.

To give an opinion upon a subject of such importance, without due consideration, would argue a degree of rashness, which no man who values his reputation would be guilty of; under such impression, every specimen, presented by accident, has been carefully examined, while numerous others have been procured for the same purpose; the whole of which has tended, more or less, to support the general reasoning, and warrant the conclusion as above.

The opinions of workmen have likewise been attended to, and the result has been remarkably uniform:—all such as had worked only upon young free-grown subjects, entertained an opinion, that the Timber was of an inferior quality; but such as had worked upon old trees, have as constantly admitted the advantage of age,—while all agree, that their knots are a very serious defect.

If we contrast the circumstances under which Foreign and British Fir Timber are usually brought forward, we shall find many reasons for the general prejudice in favour of the one, and to the detriment of the other. The first is uniformly brought from climates, that, compared with ours, cannot be called warm, and such as we call Timber, is always of a good size and age, before cut down; indeed we never see the worst part of it, say—that which grew near the tops. Besides, in reducing it to Logs, the greater part, or the whole of the sap is cut away; as both ends are brought to one scantling; and what we have in Plank is necessarily still more reduced, to bring it to the usual breadth. We may add too, that *such* have always a reasonable time for seasoning, generally a very long one; and we may be sure they are taken down at a proper season.

The above, which may be called favourable circumstances, form a very striking contrast with the state of our own. It is generally produced in situations somewhat warmer, therefore it grows quicker; it is cut down young and small, and used with the greater part of the sap, or later years' growth upon it; and as to the time for taking down and seasoning, neither seems yet to have been attended to. We do not expect to reap the other products of the Earth in perfection, without bestowing somewhat of care or *management* upon them; and it is equally disgraceful to the national industry and intellect, to condemn the article, as radically bad, till every probable, and even possible means have been tried, to amend it,—and tried in vain.

If the foregoing be the true state of the case, it must be obvious that the real defects of the article are reduced to a small compass, namely Knottiness, the consequence of the natural form of the plants, and want of density, the consequence of quick growth.——For the sake of order, the reader is referred to the article PRUNING, where a preventive for the former defect will be clearly pointed out, and therefore, for the present, our attention must be principally directed to the latter.

Dr. Smith observes, in his Essay on the production of Timber, in the first Vol. of the Transactions of the Highland Society, 185,—that "the Scotch Firs "growing naturally in the upper part of "Argyleshire, and also in the north "Highlands, as also at Braemar, at the

" Head of the River Dee, are so excel-
" lent in quality, as not to be surpassed
" by any Fir Timber in the world," and
adds, " he has seen some of it, which
" after it had been 300 years in the Roof
" of an old Castle, was as fresh and full
" of sap, as new imported from Memel,"
and " that part of it was actually wrought
" up into new furniture."

From the above, one would be led to suppose, the Timber so " excellent in " quality," grew only in situations equally EXPOSED and ELEVATED; as the lands in question are said to be the highest in Scotland; and consequently, that such places only could produce good Fir Timber: but this, I am well assured, is not the case, as a communication, (for which I have to thank that enlightened Planter, Sir Archibald Grant, of Monymusk,) puts the matter into a different light. He says, " —In the higher parts of this county, (Aberdeen-

"shire,) from the source of the Dee, "and many miles down that river, also "along a great part of the length of the "river Spey, there are extensive forests "of the Scotch Fir, which there grows "to a large size, all natural wood. The "ground, in the vicinity of these rivers, "is the most elevated of any in Scot-"land. But, it is not thence to be in-"ferred, that the Firs grow on these "Alpine regions.—It is only in the val-"lies, on the borders of these rivers, and "the smaller dales on the banks of tri-"butary torrents, consisting of alluvial "soil, formerly brought down from the "mountains; in the gentle slopes at "the bottoms of hills, or the elevated "recesses of the mountains, that these "trees thrive, and become valuable; "not only on account of their very "great size, but also for their excel-"lent quality, which is often not in-"ferior to that imported from the Bal-"tic."

Here then we have satisfactory proof, that Fir Timber is produced within the island, grown in situations ELEVATED, but SHELTERED, sufficiently good to be a substitute for the foreign; which does away the idea, that none but the coldest situations produce such an article.

These accounts agree, in representing natural grown timber as superior to planted. Dr. Smith assigns no reason for it; only concludes, such Firs are a superior species to what are found elsewhere.—Sir Archibald inclines to think, that it is occasioned by the trees making a tap root, and consequently, taking firmer hold of the ground than the planted ones.—On this point, I cannot help differing from both; being decidedly of opinion, such superiority is no other than the effect of superior age. We have good reason to believe, that all the Scotch Firs in the SOUTH part of the island, were originally produced from the natural Woods in the NORTH, *as there are no such Woods in the South:* indeed, the term *Scotch Fir*, seems to fix *that* as the place; and, therefore, the idea of a superior species can have little weight. As to the timber being superior in quality, we know of no *natural* reason which can be assigned to countenance the supposition, except it be, that a tree, never removed from where the seed was sown, produces fewer roots than a transplanted one; and when, as is supposed in this case, one of the principal strikes into a soil less fertile than the surface, the tree must grow slower.——The plain inference from which is, that the Wood must be more dense, and of superior quality.

But admitting that no such reason as the foregoing existed, (for probably many who look only at the surface of things, may be inclined to dispute the point,) still there is *a cause*, which must always have some influence upon the growth and quality of the article. Planted Firs rise as it were in a mass, and, by sheltering, promote each other's growth, in a much greater degree than can happen to such as are self-sown; and, therefore, equal scantlings will be different in age, and hence the difference in quality.

In order to show how far the article is improved by *age*, independent of size, a tree, about forty years old, was selected that had grown very slowly nearly half the time, in consequence of having a very small top, and being almost overhung by others. On examination, the Wood was found exceeding good, though the scantling did not exceed seven inches:—compared with some of the best Petersburgh Deal, it was found both tougher and harder.

As most of the foregoing observations prove, that English Firs grow rather too *fast*, than too *slow*; it will scarcely be doubted, that they may be produced *sufficiently large*. Indeed the fact is demonstrated in so many places, as to silence incredulity. We shall, therefore, mention only two instances, where the trees are certainly *large enough*; not only for ordinary, but *extraordinary* purposes, not excepting masts for ships. The first is in the park at Woburn, where we find *very* large ones;—the largest, a Silver Fir, may be seen, for many miles, rearing its tall head above any other tree around it. The dimensions in March, 1805, were as under:

	Feet.	Inch.
Circumference just above the swell of the roots	9	9
Ditto, at 27 feet high, being where the first branches break out . .	8	2
Whole height of the tree	107	0

It is to be remarked, that this tree grows upon the summit of a hill, (Stump Cross,) and that in consequence of getting higher than any other, its head has been for many years completely exposed, and therefore is in every part exceeding stiff, in proportion to its height; had it been *sheltered*, it is probable it would now have been considerably higher.

The other instance is found in that well-known pleasurable resort, Studley Park, near Rippon, Yorkshire, where many Spruce Firs measure nine feet in circumference, just above the swell of the roots, and taper off gradually to the height of more than a hundred. As they are sheltered, and growing freely, it is impossible to guess what height or scantling they may ultimately reach.

On the whole, it is presumed, that such persons as will give themselves the trouble of investigating the subject, as far as the Writer has done, will come to the same conclusion,—namely, that *it is very easy to grow Fir Timber in this island, proper for every purpose, to which Foreign Fir is usually applied* :—and such as will not so inform themselves, must submit to be told, that their opinions, if opposite, can have little weight*.

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* The consideration that the Scotch Fir, one of the articles in question, will grow freely upon almost any soil in the country, (the most barren heaths not excepted,) adds not a little to the importance of the subject:—and yet, with such facts constantly before their eyes, many people seem to decide upon the point without consideration, as dogmatically as they would pronounce between white and black.—Dr. Smith, just quoted, who is in other respects sufficiently zealous in advocating the cause of planting, is an instance in point.—He says, "the "Timber of the Scotch, Spruce, and Silver Firs, is "not of great value,"—he *likewise* says, that "every "branch and leaf is a caterer for food, as well as every "root and fibre, and the tree is deprived of nourishment, by the loss of the one as well as the other," and

While on the subject of *Firs*, it would be highly inexcusable not to pay particular attention to the *Larch;* an article which grows rapidly upon some of the *Worst Lands* in the Empire; and is, at least, equal to Foreign Deal, for all the purposes to which *that* article is usually

accounts for it by saying, that " Trees probably de- " rive much less nourishment from the ground, than " they do from putrid vapours, air, rain, and sun- " shine;" which circumstance, he says, suggests what experience proves, that " Trees ought seldom or ne- " ver to be pruned, except the branches that decay, " or wither." On all which we may briefly observe, that it does not appear he has made himself acquainted with the different circumstances, that influence the quality of Fir Timber;—nor do the other remarks exhibit him, either as a person of *much* observation or experience; for a little of the *former* would have shown him, that both the *form* and *strength* of Fruit Trees are astonishingly improved by pruning; and he might reasonably suspect Forest Trees were subject to the same natural laws.—The *latter* would have made him *sure* of it, by proving, that a great proportion of the *caterers*, for whose preservation he applied, and much superior for many others.—The Reader will observe that, whatever is asserted unequivocally, in the course of this investigation, is the result of experiment; where I have not had that advantage, the expression is qualified accordingly.

Larch excels Foreign Fir in all the following respects:

First, It is much clearer of knots, provided a very small degree of attention be paid, in the first twenty years of its growth. Indeed, I know of no tree which

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seems so solicitous, are little better than a species of ROBBERS, who are much oftener found "*catering*" for SELF, than the common interest.—In due time their delinquency will be made manifest; in which case, we are sure neither Dr. Smith, nor any other patriotic Scotchman, will object to their being dealt with in a manner congenial to the mild spirit and practice of Caledonian Jurisprudence,—namely, by BANISHMENT.

can be grown with a long clean stem, with less trouble; nor any that thrives better with a very small head. Compared with English Firs, it has, in both respects, greatly the advantage.

Secondly, It is more *durable;* for though it produces dead knots when neglected, still it produces no rotten ones, or what Carpenters call *Cork Knots.* The fact is, that not only the heart and sap of the wood, but even the bark is of so durable a nature, that we know no means of estimating when any one of them will decay; except under some species of mismanagement.

There is a particular criterion by which Larch is distinguishable from any other wood; which is, at the same time, a decisive proof of its durability.—The dead knots, or branches, wood and bark, being always found fast *wedged* as it were, in the timber; so that every knot of that description has a sort of ring round it, nearly black.

Any person who has Larch Firs growing, of some tolerable age, may convince himself of their durability, by examining their dead branches; which, whether great or small, *are never found rotten.*

The foregoing would have been thought sufficient, if I had not found *the durability of the sap* considerably discredited, in a most respectable publication.*— There we have the particulars of an experiment, to ascertain the durability of twelve different sorts of timber, when exposed in all weathers; by which *it appears*, that, after being so exposed for ten years, the "HEART *of the Larch* "*was sound, the* SAP *quite decayed;*" a result completely incompatible with every observation I have been enabled to make upon the subject, which are by no means few.—It seems, indeed, perfectly unaccountable, under any other idea, than that of supposing a mistake.

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* The Bath Society's Papers, vol. 3, p. 155, and copied into the Annals of Agriculture, vol. 6, p. 256, and the Encyclopedia Britannica, under the article "TREES."——The celebrity of these works is the best apology for examining the accuracy of the result, which, if erroneous, is calculated to do considerable mischief.—Undoubtedly there are many hundred millions of the Larch now growing in this island, which are

The experiment was made by order of a Nobleman, with an intention highly honourable to himself: yet it is obvious, that the value of such experiments must depend entirely on their accuracy, and of *that* we can have no great dependence,

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large enough to be useful for numerous purposes. ——*Surely* then it is of importance for the proprietors thereof, and the public, to know with *perfect certainty*, what are the essential properties of the article; as *that* alone can fix its *value*, and proper mode of application.

where the business is somewhat complex, and must, as in this instance, go through the hands of Sawyers and Carpenters.—Here were twelve sorts of wood to dispose of, with not more than half of these the workmen could be much acquainted. If a log or a board of the others got misplaced, in any part of the business, it is difficult to conceive how it could be put right again. We cannot possibly admit a solitary experiment, thus conducted, to contradict the evidence resulting from the most assiduous research into the subject for several years; for if it be admitted, that by such means the Larch had got into the place of some other wood, (probably the Beech,) the result as to both would be exactly what might be expected, and the Larch be restored to the credit and consequence to which it is justly entitled.——The late Duke of Bedford had an experiment made somewhat similar, but

BIBLIOTHECA BODLEIANA

Plate 2

having afterwards discovered some inaccuracy in the process, the result was never noticed.

To meet the experiment in a satisfactory manner, Fig. 4, on Plate II, is introduced. The engraving is made directly from the end of a Larch board, which has been some years in my possession. A shews the core of the wood, and the origin of a branch: B the part which was the outside of the tree, when the branch died, and likewise, some remains of the woody part of it. The dark part, C to C, is the cavity made in the wood, by inclosing the branch with the bark upon it, *after it was dead*; part of the latter still remaining in it, as the *saw* has accidentally gone exactly in the line between that and the wood. If we count the annual circles of the wood, or curved lines, we find it remained in that state, at least thirty two years upon the tree; but how much longer we cannot say, as the board has not all the sap left upon it.——It must have been SOUND all the time, otherwise the pressure of the wood, in enclosing, would have displaced it; and from its size, it could not be otherwise than *most of it* SAP.—It is likewise worthy of remark, that the board is from the root end of the tree; the situation of the branch having evidently been within a foot of the ground, and of course, more exposed to moisture, than one more elevated.——The board will be left with the publisher, for the inspection of the curious*.

Thirdly, Larch is much less liable to shrink than Foreign Deal.—It is well known that the latter is exceedingly liable to that defect, in the first instance; and the Joiners tell us, that when a board of it has been twenty years in use, if planed over again, it will again shrink: but not so with Larch: for, if well dried at first, it never shrinks at all.

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* Though the engraver has done great justice to this subject, *the board itself* exhibits the matter much clearer.—If this sort of proof do not work conviction, we shall despair of demonstrating any thing.

I had a *Desk* and *Bookcase* made of it five years ago, every joint of which is now as good as when put together, though the room where it stands is rather damp, except when a good fire is kept, near to which it stands, which must be allowed to be a very trying circumstance. The workmanship was very good in the first place, and therefore left no room for deception on that head.

A piece of *Larch Wood*, split from the root end of a slab, was weighed at different periods. The tree having been cut down in August preceding, and sawn up a few days previous to the first weighing, gave the following results.

	Date when weighed.	lb.	oz.
1799.	1st October	12	11
	19th October	10	4
	25th October	9	0
	13th November. . . .	7	13
	9th December. . . .	7	11
	30th December. . . .	7	9
1800.	31st January	7	9

The weighing has often been repeated since, but no variation was found while it was in the same place, namely, a dry room over one where a good fire was kept.—The piece is nearly all sap.—From which we gather this important information; the Larch may be perfectly seasoned in three months, with a very moderate heat, and probably much sooner, as the next circumstance to be noted seems to shew.—When wood can lose no more weight, we take it for granted it is perfectly seasoned, and as this is so soon attained by the Larch, there can remain no just apprehensions of its shrinking.

Fourthly, Larch will not crack with any degree of heat that can be called tolerable, when in plank or boards, or when the poles are split as rails. When in bulk, I have not observed that the case is different, provided the bark remains upon it, but if *that* be taken off while the article is green, it cracks considerably, as will be noticed under the seventh head.

Fifthly, Larch is much more tough than Foreign Deal. It splits with great difficulty, and never in any length with the grain. Foreign Deal being so exceedingly apt to split, can seldom be used very thin; but the Larch, may be used as thin as the sawyers can cut it, without any danger on that head. This circumstance must greatly enhance its value, as, in numerous cases, a board of it dressed to a quarter of an inch, will answer as well, frequently better, than a Deal one of twice the thickness. In turned and carved work it must be admirable, and more particularly so where the members are small. It will likewise prove one of the best woods yet known, as models for iron or brass-founders, as it may be worked to as great a nicety as metal itself, and will be in little danger of damage, either in making or using; or the intervals between its being made use of.

In the sixth place, we have to notice two properties, the first of which the Foreign Deal does not possess,—and the latter but in a very inferior degree, namely, its beautiful colour, and being capable of receiving a degree of polish equal to any wood yet known; and much superior to the finest *mahogany*.——It is, indeed, difficult to say for what article of useful, or ornamental furniture, it is not proper. Its heart is of a faint salmon colour, and the sap white, when raw from the plane; but the application of raw linseed oil *only*, brings both, gradually, to a beautiful *Nut-*

Brown, and so nearly alike, that it requires a very good eye to discover the difference. ——It likewise admits of being stained the colour of mahogany*.—In *Bed-Posts*,

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* The method of turning Larch a mahogany colour. Provide two small painter's brushes, which must be clean, with a quantity of the best Aquafortis, and raw Linseed Oil; one of the brushes must be prepared, to prevent its burning, by soaking it in the oil, and then squeezing it tolerably dry; after which the spirit is to be laid on with it upon the work, making the whole equally moist. This must be done as expeditiously as possible, and followed up by holding it a few seconds before the fire, when the required colour will be produced. The operator will judge when it is high enough. Then oil the whole well over with the other brush to stop the effect of burning; which must be repeated as soon as the oil is absorbed. Observe, that the staining is to be applied to articles in a raw state, as oil resists the spirit, and the same reason makes it necessary to be cautious not to oil after staining, beyond its effect: Generally, the best way is to do the whole of one surface, or as many more as convenient, at one operation; never leaving a part of *one* undone.——The strength and effect of the aquafortis should be tried in the first place, on a

Staircases, &c. the stained work looks excellent; but, in my opinion, not so well in *Doors*, and such articles as directly meet the eye, and present a large flat surface;

piece of the same sort of wood. If the colour prove too high, the spirit may be reduced with water.—To prevent the brush burning it must go into the oil after every third or fourth operation, as at first.—The operator must have the spirit in glass only, and consider he is using *Fire*, though in a liquid form.—Observe also, the heart and sap of Larch do not stain to just the same colour, and therefore in such work they should not both appear on the same surface.

Cabinet makers ought to consider how far the Larch might be useful, in Bookcases, Sideboards, Drawers, or any other ornamental Furniture, intended to be veneered. At present, these articles are only a sort of sham or patchwork, as a very small part of them, the veneering only, is made of ornamental mahogany; the rest being usually of an ordinary sort, with the addition of oak and common deal.—If instead of this medley, which always offends the eye, when a door or a drawer is open, the whole basis was Larch, such opening would present a neatness, and uniformity, greatly superior to any thing usually exhibited in such cases.

for *there*, the only respect in which it is inferior to mahogany, is most conspicuous, being somewhat deficient in variety. In the two former respects, and all other, where the members are small, such variety is not expected.—In its natural colour, the idea of mahogany is not presented, the appearance being much nearer

By proceeding as above, little of staining is required, the outsides of the ends, with the cornices, and feet comprising the whole.—It certainly would look well in the two latter situations, and in the former be much superior to the sombre sort of mahogany, generally used, as its colour would match abundantly better with the light veneered work.—Taking appearances altogether, there would certainly be an improvement, and as to other circumstances, I have no doubt, but the Larch must, upon the whole, deserve the preference, independent of the important consideration of saving, at least, one half in the value of the wood.

We might observe, that Larch Furniture, after once brought to a good polish, requires not one quarter so much attention as Mahogany; the very best of the latter has a rough, uneven surface, when magnified;

that of OAK, but greatly superior, in every point of view.

The seventh and last point of superiority, to be noticed for the present, shews the Larch to be qualified for extensive usefulness, in a situation that few persons would suspect, as it is known, that in it the best Foreign Fir proves of very short duration,—namely, as posts for every description of fencing.—The facts I have to detail upon this subject are as follow.

About four years ago, being then cutting up a quantity of Larch, for railing and other purposes, a part of the knotty

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which accounts for the dust it holds, and hence the perpetual rubbings, absolutely necessary to keep it in order. Larch, on the contrary, when submitted to the same test, presents a surface perfectly smooth and even, consequently, after being once well polished, it assumes a shining, glassy face, from which the dust is as easily removed, as from a polished mirror.

tops was sawn into scantlings of about one inch and a half square, for the purpose of staking, or tyeing up plants in the nursery. On examining their condition a few weeks ago, the whole of them were perfectly sound above ground, and all that had been used with bark upon them, the same, so far as they were covered by it, whether *near the surface* or considerably below it; indeed the wood under such bark appeared as *smooth and sound as when first cut up.* The only symptoms of decay which appeared, being upon the CUT surface of the SAPPY parts of the Wood, that had been in the ground.

The above interesting result is rendered still more satisfactory, by considering that it may be accounted for upon natural principles, in the following manner.—The sap of Larch is composed of a resinous matter, which, no doubt, is the principal cause of its durability; and *that* article is much more abundant, near and even upon the surface, than farther within the wood, as *it* was the situation of the principal sap-vessels, the year before the tree was taken down. The quantity of the article is clearly observable by the naked eye, in the sun, after the wood has been disbarked and somewhat dried, but much better with the assistance of glasses; in which case, it appears so extremely full of resin, that it is very easy to conceive it impenetrable by moisture, and hence the *particular sort* of durability now noticed.

The result of the foregoing observations, very naturally led me to a careful examination of the state of a Larch Post, which had laid "unheeded by," since the year 1800, which, if my information be correct, had previously been in the ground upwards of twenty years. Hitherto it had been observed, that every part of it which had been above ground, including the mortice holes, and the parts under the shouldering of the rails, where the painter's brush could not reach, were perfectly sound. As to what had been in the ground, the parts near the surface, where the bark had been taken off, with a part of the wood, are somewhat decayed, but not deeper than the sap.—It is to be observed, this post was made from the whole tree, and that, in squaring, all the outside was taken off to some inches beneath the ground; below *that*, the squaring was sloped outwards, by which a great part of the bark was there retained; and so far the wood under it is sound, except some trifling decay at the edges; it having evidently advanced from the sides, not the surface.

On examining the bottom, and likewise the sides, where branches were taken off, it is clear that no moisture has been imbibed by either, sufficient to do any damage. Taking the appearance of the whole together, every circumstance goes to establish an opinion, that, had all the bark been left on the part within the ground, the post might have lasted for ages.

The useful inference from the above is this. Larch posts, to have the greatest possible degree of durability, must be made of the *whole wood*, retaining the bark upon the part to be put into the ground. In all cases, where simple usefulness only is required, the best method would be to retain the *whole of it;* except what may be displaced by morticing, &c.

Where neatness is required, squaring or rounding becomes absolutely necessary; and therefore, care should be taken to have the wood *seasoned;* for otherwise, *it will crack considerably after the bark is displaced.* Perhaps the best method of doing it, would be to have the trees taken down in Autumn, at the expiration of the growing season, and exposed to the weather for twelve months at least; by which time, it is presumed, they would be so far gradually dried, that little of cracking could afterwards take place.—The necessity for seasoning is obvious; but it is not pretended the above is positively the best method of effecting it, as no time to make experiments has elapsed, since the durability of such posts was discovered; every one will, therefore, use his own discretion in that point, being fully assured that such *cracking* must be avoided, or the article will be very materially damaged.

In proof of the last assertion, we may notice the state of great numbers of Larch Rails, in this neighbourhood. HERE, very unfortunately for the purchasers, an idea has been prevalent, that the best method of making Fir Rails durable, (the Larch included,) is *to take off the bark;* and hence, it has been common to have them cut down, when the sap flowed most freely.

Whether the time of cutting down, and the taking off the bark, was right in regard to Firs, generally, I am not prepared to decide with certainty, but am inclined to believe, that it is wrong; as, if not immediately split, the sort of cracks we have been speaking of, must follow as the certain consequence; yet, if the poles were used in a perpendicular direction, or were not exposed to moisture, such cracks would do little damage; but when exposed to the weather, in an horizontal position, as every crack, whose opening is upwards, must not only *collect*, but *hold* water, the sap, or least durable part of the wood, is constantly exposed to the extremes of drought and moisture. The bark is certainly taken off, to prevent the moisture lodging between that and the wood, and thereby occasioning rottenness; but whether the evil intended to be prevented, is not generally promoted by such means, must be left to the intelligent.

As to the particular case of the Larch, I can have no doubt; indeed, the only case, in which I have yet found any Larch wood rotten, that had not been in the ground, or exposed to alternate drought and moisture, *is that of rails, &c.* managed as the above, namely, cut down green, then disbarked, and afterwards used whole. Within a few hundred yards of where I am writing, there are many such, decayed less or more, in and about the cracks; in some few instances, all the sappy part is gone from one side, for more than a foot in length; while, on other parts of the same rails, where no cracks appear, or where parts of the bark have been left on, the wood is as sound as when first put up. If, after this, people will persist in the practice, I can only say, the fault is not mine.

reflecting upon a circumstance somewhat similar. The curled top made its appearance among potatoes about thirty years ago; and for several succeeding ones the evil seemed to increase. The cause was then, and still remains unknown, though every possible exertion has been made to discover it. It appeared gradually, and got to such a height, in about ten years, as to be truly alarming: from that period it seems to have been upo nthe decline, so that NOW "*the* "*Pestilence that walked in Darkness,*" rendering useless the efforts of human industry, is subdued by that *invisible* POWER which "rides in the whirlwind and di- " rects the storm."

Of the *Larch insect*, we may remark, that it was by no means so prevalent last summer, as in that preceding, nor is it in the present, (1805;) I attribute this to the seasons being more moist. It is observable, we have had no long frosts, of two or three winters; mild ones are highly favourable to the increase of insects, and severe ones the reverse. Probably, we have much to hope in favour of the Larch, from the first which may happen. The insect seems of a very delicate texture:—one can scarcely suppose it to be a native of the cold quarter, of which the Larch is said to be, namely, the Alps and Pyrennean mountains*.

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* The following had been mislaid, but I think it would be unpardonable to omit it.

Perhaps there is no situation where the Larch would appear to more advantage, or occasion a greater saving, than in the fitting up the interior of what may be called an elegant shop;—being equally calculated for shelves, drawers, and counters, *without the addition of paint.* In that case, the cornices and edges of the shelves only would require staining, after which, three or four times oiling, in common with the counters, drawers, &c. would complete the business, and produce an effect superior to either paint, common mahogany, or both.

Upon the subject of English Fir Timber, (the Larch included,) I have been somewhat diffuse, for this plain reason; the credit of most other sorts of timber is sufficiently established, while the value of English Fir is so little understood, that, with many *pretended judges*, it is still a question, whether it is entitled to any credit at all. To such I would say, continue to doubt, if you please, but by no means commit yourselves, by presuming to influence the opinions of others, or joining in the cry of depreciation, till you are well informed in all the following points, viz. The specific difference which age makes in it,—the mode of improving it by culture,—the time of cutting down,—the manner of seasoning,—and the proper mode of application.—Apply these to the case of other timber, and we find all the circumstances, (the second excepted, and who can estimate the loss in consequence?) pretty well understood; and hence the business goes on rather smoothly. If men were really as ignorant in these matters, as they are in regard to the others, every sort of timber would be disgraced by turns, the Oak not excepted*.

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* When the press had proceeded thus far, an opportunity occurred of examining some Larch Spars or Rafters, which had been in a mill about twenty-four years; and, likewise, an English-grown Spruce Fir Log, of about fourteen inches square, with some balks or summer-trees, made from the same, or a similar tree, cut down the middle. The former have the bark upon them, and are all sound, except in a few places where wet has fallen. The latter are perfectly so, including the bark; much of which still remains upon them, as firmly united to the wood as when first used. This circumstance sufficiently proves, that my conclusions, respecting several sorts of Firs, are perfectly correct as to one of them. It is indeed to be lamented, that such proofs are not every where to be met with; as they would have a direct tendency to remove prejudice, instruct the ignorant, and silence the cavils of SELF-INTEREST.

Perhaps, at first sight, a true Briton will scarcely believe any of his countrymen so destitute of patriot-

We come next to treat of a defect in timber, at once extremely common and pernicious, namely, *rottenness*, and *hollowness*,—the latter being only the effect of the former. This defect is sometimes occasioned by the soil, sometimes by extreme old age, sometimes in consequence

ism, as obstinately to depreciate the produce of his native soil;—yet ("O Shame, where is thy blush!") such are to be found!—as the following short account will sufficiently evince.

A person, who happened to be near when the above were examined, could not be persuaded to look at either, yet stiffly asserted the former were all rotten, and that it was impossible to make a roof of English-grown Firs, which would be either straight or durable; consequently concluding that the whole family were *worthless sticks*, fit only for the fire. It was in vain to attempt to refute such *well-founded* assertions; besides, truly, the man was wroth, and would not listen; no mean proof this, that he was *in earnest*.—The Craftsmen, at Ephesus, were in a *similar panic*, when they cried out, "Great is Diana of the Ephesians."—

From many observations, made since the above was written, I see no reason whatever to change my opiof branches being torn off by the wind, and sometimes by the woodpeckers; though, in most cases, it is clearly the effect of *neglect* or *mismanagement.* What we have to advance upon the subject, so far as it respects the extremities, will come forwards most properly under the next head; and, therefore, we shall here principally notice their causes and effects, as operating upon the *Stem* and *larger Branches* or *Arms.*

Rottenness, where no external injury has been done or happened to the plant, presents, at first sight, the idea of stinted nourishment; the tree must be generally

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nion with regard to the valuable properties of the article. Indeed, with the generality of intelligent purchasers, the *qualities* of the Larch is *now* less frequently a question, than *where it may be procured.* It is also consolatory to remark, that the ravages of the insect continue to decrease. Should it, indeed, never become more numerous than it has been through the present season, it would be considered of little or no consequence.

or partially deficient of sap. The effect, in either case, is, in the first instance, the same; the branches which are worst situated, receive the least support, and therefore die first. When a branch dies, the next consequence to be expected is its rotting. Different subjects, and an innumerable variation of circumstances, may make the time shorter, or longer, but with all that I know of, (the Larch excepted,) it follows of course. And we may remark, generally, of the Oak, that it is one of the first " to see corruption:" nor do I know a subject among the inhabitants of the forest, upon which it afterwards works with more effectual speed. To trace its effects, we may suppose the case of a tree with a rotten branch, and that placed in a direction inclining upwards. In this case, we must observe, that the decay does not end where the branch joins the stem or arms; as it does not stand upon them like a nut, or an acorn, in its husk, except when produced by *unnatural* *means*, and even then, its origin will lie as deep as that which was the *surface*, when so produced. For natural branches originate directly at the *core* of the part from whence they spring. (See Plate III.) An extreme branch, for instance, is directly connected with the core of that which produced it, and so on, through the different gradations, to the stem; consequently, rottenness beginning in the former, descends as naturally, and certainly, (if not prevented,) to the root, by means of the core, as the rivulet, gathered upon the mountain's brow, finds its way to the river in the plain below; the only difference being in the degree of expedition.

When a rotten branch falls, it leaves a hole, equally calculated to *receive* and *retain moisture*, which, acting upon the core or pith, as well as the end of the wood, carries on the business of putrefaction, with a rapidity scarcely to be credited. Hence we see, that the defect under consideration, is often occasioned by neglectin to take off such branches, while they a only partially rotten, though certainl much oftener by the careless, or over cautious method of lopping trees, which w are next to notice.

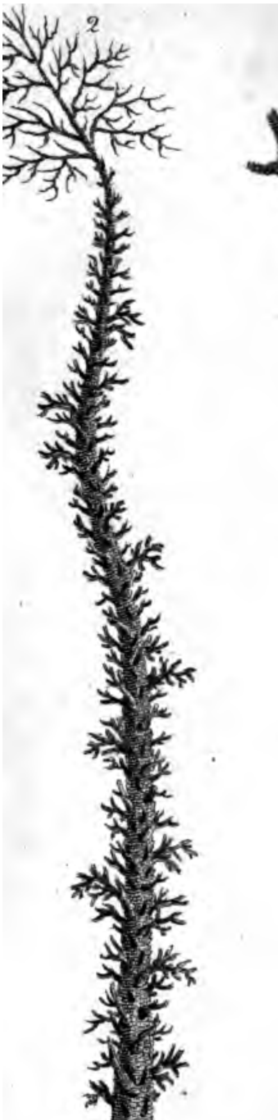
The method alluded to, is that of lea ing stumps, or snags, of a few inches i length, instead of taking off the branch close by the stem. The careless do i merely because it is a more convenie and expeditious method, than close cu ting; and the cautious, because they su pose such cutting would occasion a sca or rottenness: how truly, will be examin in due time. Here, we readily admit t careless man's reasoning, if he will allo us to say, a method may be *extremely ba* that is both easy and expeditious.—A if it be bad, *Carelessness* and *Caution* mu equally look to it; for it is practised both.

We admit that caution, in adopting such method, does its duty, as far as understood. It is meant to *prevent* scars and hollowness. The only question then will be,—Is the cautious man's theory right? for, if so, his practice would not be materially wrong. To which we answer, *certainly not.* If indeed such operator could insure every stump he leaves to produce one or more branches, then the method would have less harm in it; a *little* produce of timber, and that little *bad*, would be the worst of it. But he can insure no such thing: some stumps will not be productive, and therefore *they must die*;—when *Rottenness* and *Hollowness* follow of course:—the operator is the cause, these the effects.

When a tolerably healthy tree is *so lopped*, nature may be observed to make an effort to cure the wound, as soon as the sap begins to circulate; and such would always be successful, were no stump left in the way to prevent it; but, as the case stands, the effort is spent in forming a sort of swell round, which, in time, may grow over and enclose it, provided such stump be short. And, therefore, instead of an even surface, upon the stem, and a very trifling crack, which might ultimately be found in the wood, we have a stump, more or less rotten, inclosed within a protuberance, similar to that on Pl. IV, 1.—A.

It must be evident that, in such a case, the damage will be always in proportion to the length and size of the stump, as well as the vigour of the tree; where the former are short and small, and the tree in health, little harm is to be apprehended, as they will be grown over, before any decay can take place, but not so where the case is the reverse. A stump somewhat long, cannot soon be grown over, on *any tree;* if it be likewise thick, that will further protract the operation, while, if the plant

Plate 4th



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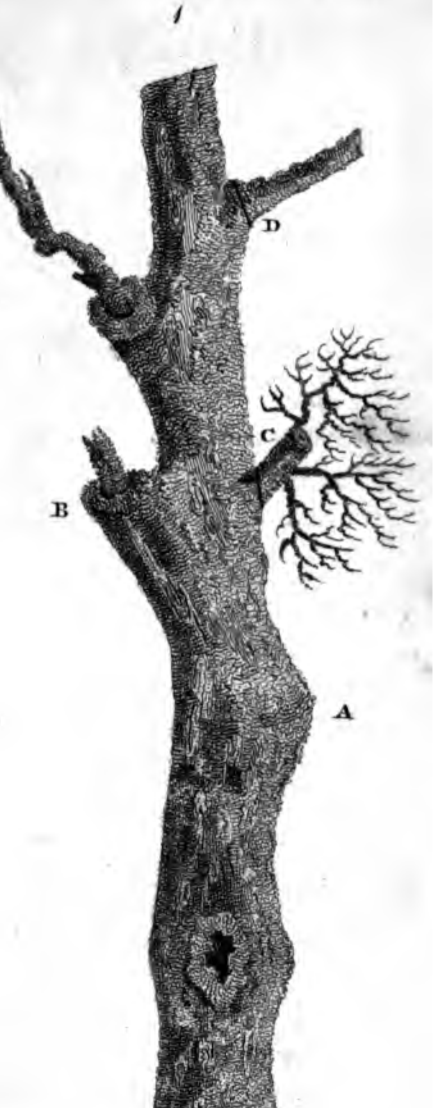

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is weak, it will be always tedious, often impracticable; so that, ultimately, here, as well as when a stump is too long to be grown over, by any effort which nature can make, we have an appearance, something like that marked B, (Pl. IV.) being a rotten stump, or the remains of a branch, which must fall off in time, leaving a cavity, the mouth of which is formed, as it were, *on purpose to collect moisture*, being usually, at least, twice as wide at the entrance as what was the diameter of the stump. And thus nature's benign efforts, primarily intended to heal the wounds, are perverted, by ignorance or inattention, to the worst purpose, namely, to accelerate the destruction or the rotting of the trees.

If then, one single rotten stump may, in time, occasion every part of the tree below it to become hollow, how much sooner must a number of such, situated on different parts, expedite the business. Certainly, under the present systematic neglect, it is unreasonable to expect to find an Oak, of considerable age, perfectly sound; indeed we rarely see one that *appears* so. Where something of this kind is discovered, more will with good reason be apprehended; and even where nothing of the kind appears, still such a subject cannot escape suspicion. As a tree increases in thickness, holes, which have long admitted wet, may grow over; and the same means often swell the stem, so far, that protuberances, once considerable, may partially or wholly disappear. —We cannot often determine the extent of rottenness, in *part* apparent, much less *that* which may be concealed under such protuberances.

The adage says, "an old oak tree is like "a merchant; you never know his real "worth till he be dead;" intimating, that no one can discover with certainty, whether it be sound or otherwise, till taken down and cut in pieces. And every man, accustomed to purchase such trees while standing, will subscribe to the matter of fact. Nobody, however, can suppose, that a doubtful article will ever fetch as much money, as one whose soundness can be depended on. Of course, the proprietors of timber suffer, not only because their article is really defective, but because what appears otherwise, *is suspected to be so.* A good system of management would, among other beneficial effects, go far to reduce the matter to a certainty.

The woodpeckers frequently make holes in trees; but such are, in the first instance, materially different from what are left by dead branches; having but seldom a downward tendency, and never any swell around them; nor do they often reach the core. In a young vigorous tree, they sometimes grow over; in one the reverse, very seldom; and, therefore, in time, the wet they receive, will penetrate to the core; after which, the defect will operate the same, as if it had been occasioned by a rotten branch.

The wind sometimes tears the branches from trees, and thereby occasions considerable scars; when they leave a part behind, it will introduce rottenness in the same manner as snag pruning. When it splits off close to the stem of a tree, tolerably vigorous, the wound generally heals without help, as here nature has free scope; in old subjects the case is otherwise: but even there, a little attention will prevent rottenness taking place, for a very long period:—this, as well as the preceding case, will be attended to, under the general head, WOUNDS.

In treating of Rottenness, the effect of a wet soil, we may be indulged in somewhat of speculation, as the first cause or causes of the evil lie deep, and must have made considerable progress before it can attract notice.

That the rotting of the roots, is the first cause of this defect, we have little doubt, but how they happened to be so, forms the difficulty. Whether from accidental circumstances, an unusual quantity of moisture had been lodged in the soil, where a particular root or roots, may be said to have made their abode; or whether such might have penetrated into a stratum, always surcharged with water in winter; it is not difficult to conceive, the vessels destined to carry on the business of vegetation, may, by such means, be rendered incapable of performing their functions; and if so, the death of such part is inevitable, after which, all that follows may easily be accounted for.

As the connection between the roots and the stem is exactly similar to what exists between that and the branches, as already described, therefore rottenness in the root will ascend to the stem; but not so speedily as the same evil beginning in the upper extremities, and descending; because moisture, in the former case, has only the power of attraction to forward it, in the latter, it has both that and its own specific gravity to assist its operation.

In giving the above account of the cause and progress of the disease, *certainty* is not pretended; the nature of the case, as has been intimated, precludes the idea. But however we may err, as to the progress, there can be no doubt as to the first cause of the evil, namely, a wet soil; nor can we be mistaken as to the remedy, or rather preventive, DRAINING:—a specific which answers so many good purposes, in woodlands of such description, that nothing short of dire necessity can justify any proprietor in omitting it. It certainly is no uncommon circumstance, for such to be more damaged, annually, by wet, than would drain them, by the means of open drains or ditches, which are not only abundantly the most cheap, but the only sort that can be effectual, except *very large covered ones*, as the roots would soon close up any other.*

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* Part of a stone conduit of nine inches square, made to convey water to the town of Halifax, was completely closed up in three years, by the Roots of some Sycamore Trees, which grew near it. The stone was then taken up, and a wood trunk, of the same dimensions, put in its place, when that also got filled up by the same means, in a like space of time. In some places, it was effected by a single fibre getting into a joint, no lárger than sufficient to admit a crow quill, many hundreds being produced from such fibre, as large as itself. In some instances this happened at a distance, more than twice the whole length of the trees,

Perhaps some persons may think this account discredits the theory just advanced, in regard to wet soils; but such is not the case: for as the roots in the water bore but a small proportion to the whole, the rest being in a very dry soil, the former would collect and distribute moisture to the latter; which would in turn supply them with what they collected from the

Dry, barren soils sometimes cause rottenness, by affording the trees only a scanty nourishment, and hence occasioning them to die gradually, before they attain any tolerable age. It is not the pruner's business to mend the soil; yet his art may improve, and even increase its produce. The method of doing so will have particular attention, under the article PRUNING.

On rottenness and hollowness, the effects of extreme old age, little need be said; as, when they are so produced, every man, who stands aloof from the tricks of quackery, must deem them incurable: most certainly we cannot effectually arrest the slow and silent march of TIME; but means may be used to retard its "stealing steps." The truth is, that what is usually called the effect of old age, is

earth; and both would be benefited, by such an exchange of good offices.

much oftener purely the result of inattention, or mismanagement; as is obvious, by some trees being fresh and lively, though some hundreds of years old, while others of the same species, and upon a similar soil, not only cease to *thrive*, but almost to *live*, before they arrive at half that age. We cannot admit that trees differ, like men, in strength of constitution, and, therefore, the longevity of one, beyond another, under equal circumstances, may always be traced to a good form, uninjured by external means. It is admitted, that a useful, and an ornamental form, are materially different, but still none can be essentially good, that is incompatible with the free growth and long life of the tree.

Withered or decayed tops, where the trees are not very old, nor the soil exceedingly bad, are occasioned, principally, either by a bad method of *pruning*, or the *neglect* of it. The circumstance is well known to be extremely common; and trees, usually esteemed the most beautiful, are most of all subject to this sort of decay; of course, the subject deserves more than ordinary attention.

The first remark which offers is, that the defect is much more common to hard woods than to such as are softer. The reason seems to be, that their sap-vessels are commonly larger; and, therefore, the ascent of the sap through them is not easily obstructed.

Again, Trees growing singly are much more liable to the defect, than such as grow in consort; the former being subject to produce branches thickly set, while the latter must, from their confined situation, form them much thinner. The defect in this case, then, may be easily traced to the branches too closely besetting the stem, and thereby intercepting the greater proportion of sap, in its ascent;—in consequence of which, the lower branches continue to shoot freely, while such as are much higher grow but little; the decline being gradual upwards, till ultimately the top begins to decay. It is not asserted that the highest branch always *dies* first, for this must, in the very nature of the thing, happen to such as are the worst situated, in regard to sap, which almost uniformly proves to be at or near the summit.

To speculate here, upon how long a tree, so situated, might live, would be entirely useless, for different circumstances must so far affect the case, as to render every thing of the kind perfectly uncertain. We know, however, that when such appearances take place, rottenness, and the train of consequences recently mentioned, must follow; and that at no very distant period: and we are sure too, that, in proportion as decay advances, beauty retires;—the scene or source of pleasure is, alas! completely changed;—and nought but moping melancholy now remains, to brood on *dying*, *dead*, and *leafless* sprays.

To say that trees, exhibiting such appearances in a slight degree, *have got to their growth*, and *can do no more good*, would be falling in with the common sentiment, which has no better reasons to support it, than that it is an *old one*; and, merely, the opinion of such as make use of it. We may say, however, that, as usually managed, it is of little consequence, whether both are true or false; for if once a tree is fully convicted of the capital crime, a *dead top*, it is either speedily executed, or left to die a lingering death, its case being considered as completely hopeless.

If the reader can for a moment conceive to himself a case extremely common; it is that of a venerable Oak, *once the pride*, now, apparently, the patriarch of the lawn;

its branches decay, one after another; it droops, as it were, not under the weight of age, but its numerous infirmities: a little longer, and its ample head, so long the subject of admiration, shall please no more. Rottenness has seized upon its vitals, and sink it must. The whole life of a man, devoted to the purpose, could not rear its fellow, the age of an ephemeron, so devoted, in proper season, might have averted its fate. Surely then no reader, who has eyes to see, or taste to appreciate the value of such objects, will grudge the time spent in investigating a cause, which oft "despoils the Oak, of "half its numbered years."

A tree, past its vigour, may be aptly enough compared to a poor man; his income is scanty, and therefore, there is a necessity for husbanding every penny; it is indeed surprising, what a decent appearance many such make, by practising the most rigid economy; but, to do that, every thing must be systematic; he dares not spend an extra shilling upon any one object; as well knowing another would want it; and just such is the case with our tree. The supply of sap is scanty, and therefore, the only possible means of preserving all its members, (supposing such preservation necessary), is *by an equal distribution*; for if one gets more than its proportion, it robs another, not of what it can spare, but of its life: sap being the only means by which it lives.

Having seen in which way the disease may be brought on, by the *neglect* of pruning, we next proceed to shew, how a *bad method* may produce the same. We frequently see oaks, of considerable height, pruned up to a small top, at one operation; when the sap not being sufficiently attracted upwards, breaks out in numerous branches upon the stem, in which case, after a few years, the tree exhibits some such figure, as No. 3, on Pl. II. Here we see the stem *infested* with a numerous set of collateral, I might say, *unnatural* branches; as they are not only produced in a manner contrary to the general order of nature, but are found directly robbing the stem of what justly belongs to it, and also monopolizing the property of their elder brethren, the legitimate offspring of their common parent.

It is truly wonderful that, with the two sorts of appearances, which have been noticed, constantly before men's eyes, they should as constantly impute the disease to the trees getting into an improper soil, and therefore deeming it a hopeless case. That it arises from a limited quantity, and an unequal distribution of sap, in the case of old trees, and such as are in a bad soil, is sufficiently obvious; while in young subjects, upon a good one, it is plainly imputable to *an unequal distribution*, only, occasioned by the bad form of the trees. It is no matter how handsome such may be, according to current opinion; the form is bad which has a tendency to shorten the life of the plant. When we see the lower branches of a tree growing freely, it is obvious the disorder does not lie in the root; and, therefore, it must be sought somewhere upon the stem, and a remedy applied accordingly.

That dead-topped oaks are very common, cannot be disputed, but certainly most so in woods where the soil is somewhat unfavourable to the article. *There,* one would suppose, the assistance of art or management would be called in to atone, as far as practicable, for the defects of nature; but is that the case? Most certainly not: for the woodman's system never bends to circumstances; and, therefore, the produce of every soil is treated alike; no matter what the consequence.

But custom cannot alter the nature of things; means which may only retard the growth of the timber on a good soil, will ruin it upon a bad one. The woodman's method of leaving the whole produce of an oak stump upon it, till the next fall, operates thus. On a good soil, though the wavers are found not large, still, as no obstruction takes place, they are in a condition, to grow tolerably freely, as soon as the stump is disburthened of its unnecessary load. On a *bad one*, such wavers are all found to be what is called stunted, or hide-bound; in consequence of which, the quantity left upon a root seldom attracts the whole of its sap, and therefore it breaks out in new shoots at the bottom; and these, having larger sap-vessels than the wavers, soon engross the greater part of that article to themselves; soon after which, their poverty and ruin is proclaimed by dead tops: the badness of the soil is re-echoed from all quarters, and the *goodness* of management never once suspected. When we come to treat of woods, it may probably be made appear, there are faults on both sides.

Short stems, and large spreading heads, though considered as beauties in single trees, are undoubtedly considerable defects where the article is grown for profit. Under the general head, Knottiness, (see p. 58), the advantages of a long stem have been noted; the disadvantage of a short one follows of course.

The first obvious remark here, is the disparity in value between the different parts of a tree, the stem and its head. It has been noted, (p. 54), that a moderate quantity of leaves and small wood, is necessary to every tree, but certainly, all above that quantity are of no use to the plant, and of little value to its owner; and therefore, a large head is, on that account, a considerable LOSS.

The value of the tops, or branches of trees, differ so much in various places, as well as such tops themselves, that it is impossible to fix upon a general rule, by which to estimate their worth, in proportion to the stems, with any degree of accuracy; but certainly, taking trees as we find them, in one place with another, it cannot offend probability to suppose their value is not more than one third; and, therefore, if, as may be safely asserted, the tops are, upon the average, twice as large as necessary, *the loss upon that account must almost exceed calculation.*

The next disadvantage attending this sort of defect, is the damage such trees do to every kind of produce, growing below and near them. A top elevated twenty-five feet from the ground, will not do half so much damage as another of the same extent, that is only elevated ten; and supposing the elevation the same, a top, properly formed by attention, would not occupy more than half the space, or be near so close as one left to form itself. A tree, extending five yards each way, only occupies about half the space of one that extends seven. Indeed, taking the circumstances of elevation and extension together, the difference between a good and a bad form, will, in regard to produce below them, be much the same as one to four.

Again. In hedge-rows, dividing fields, where grain, &c. is cultivated, the matter is of still worse consequence; as there the shade alone, beyond the limits of the drip, frequently does more harm than the drip itself. Shade prevents the grain filling, and ripening sufficiently, and also, has a direct tendency to promote the mildew; an evil, under which the country is, at this moment, (1805), suffering severely.

If required to give an opinion, of the *policy* of planting trees in such situations, we should say, that it was worthy of the times which gave it birth: we cannot fix the date, but know their character, which was that of extreme ignorance, so far as regarded agricultural pursuits.

When a timber owner occupies the land himself, the loss falls in its proper place, but not so when, as is much more common, it is let to a tenant, who must pay both rent and taxes. By him these inmates may be considered as soldiers at free quarters, who will be served first, regardless whether any thing is left behind; while the tenant is put upon doing, what human nature, in its present imperfect state, can scarcely be supposed capable of; namely, standing by, as an unconcerned spectator of the ruin of his hedges, and the spoiling of his corn.

Often, however, while the hedger is racking his invention, to find ways and means to repair the damage made by these *very trees*, the great command—"Thou shalt not lop or crop,"—is forgotten: their branches are hacked off, for the purpose; and hence we have *protuberances, knots, rottenness, hollowness, unnatural branches, and dead tops.*

BIBLIOTHECA BODLEIANA

It is not said, that it would be desirable entirely to discontinue the growing of trees in hedge-rows, even where grain is grown; for a few may be permitted, under a good system of management, *any where*. Among grass fields, it is the excess, and abuse, in the practice, which are principally complained of. Certainly, so far as appearances are concerned, a few are abundantly preferable to many.

To such as have hedges to make, it may be suggested, that the *policy* of planting many trees in them is essentially bad; as, independent of the damage they do, such are in the very worst situation for making a profitable return, if left to themselves; and, if otherwise, they would require three times the attention, of the same quantity of timber in a *Wood* or *Plantation*. Their form too, must be of the worst sort to yield any beneficial degree of shelter. Every thing may be good or bad in certain situations; the *shade* we are condemning in one place, is easily converted into *shelter* in another. When we come to treat of plantations, its beneficial effects will have due consideration.

That the defect we have been noticing is very common, must be admitted; though no where, within my observation, so universally, as in the *New-Forest*, in Hampshire; the timber of which has long been a subject of *national boast*. The quantity of trees is indeed very great, and the quality of the *timber* good, so far as it deserves the name; for fire wood is not TIMBER. Here, we may truly say, *nature planted*, the *cattle pruned*, and the soil gave an abundant increase, while MAN did—NOTHING.—And what is the consequence? Exactly what might have been expected:—We do not find one tree in a hundred, with a stem two feet higher than an ox can reach. So that, instead of their being twice as long as the head, the latter is generally three to five times as long as the stem. The character of the place naturally creates high expectations; with such I visited it, and am sorry to say, was completely disappointed. To a nation situated like this, a large forest of fine timber would be a proper object of national pride. As the case stands, it is not said, that the *New Forest* is matter of disgrace; but, certainly, it reflects no credit on any body.*

In reflecting upon the wide-extended waste occasioned by the defect just noticed, some interesting considerations present themselves. First, something is wrong. Nature qualifies our trees to produce, at least, three times as much weight in timber, as boughs; yet, as things are managed, or rather neglected, the quantity produced seldom exceeds an equal proportion. In the place just mentioned, it rarely amounts to one third.——Secondly. The amazing quantity of FINE, though short stems, produced in the *New Forest*, suggest the idea, that the means, by which such are produced, must be *exceedingly simple in itself*, and of course easy to practise; for we are sure, that *there* the premeditated assistance of man has not been made use of; except, haply now and then, the necessities of some poor shivering cottager* occasioned the removal of a few dead branches, which the *Family of Pruners* before-mentioned could not reach.

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* From the following paragraph, extracted from the public Newspapers of the present year [1807], we may form some idea of what has been, for many ages, the management of Timber in the New Forest.—

"It appears, by an order from the Lords Commissioners of the Treasury, that an act passed in the reign of William III. for the increase and preservation of timber in the New Forest, and that two thousand acres of that forest were enclosed for the growth of timber for the public service. As this timber becomes past danger from the browzing of the deer, &c. the inclosures are thrown open, and more waste land inclosed to keep up the continual number of two thousand enclosed acres. Agreeably with the abovementioned act, the Gazette gives notice that 1022 acres are become past danger, and are thrown open, and that an equal quantity of waste land is to be enclosed in lieu thereof."

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* To slide over the present occasion, without dropping a word on behalf of those distressed creatures, would, I conceive, be an unpardonable act of inhumanity.—It is the custom in many places to banish them entirely out of the *Woods and Plantations*, under an idea that they break the fences and damage the trees; but that, I believe, seldom happens, except where they are not treated with confidence.

Shaken Timber (or what are called *Wind Shakes,*) is a very common defect, but not in every case easy to be accounted for. Its name points out the general opinion concerning it; which is allowed to be correct to a certain extent. Undoubtedly, this sort of defect may be sometimes found in trees, that never came under the

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The displacing of rotten boughs can in no case do harm, on the contrary, in *many* it must do much good. Give them liberty to do *that*, as well as to pick up such as fall spontaneously, and make an example of such as break the rule, by expelling them the premises in future; or by legal means, where the offence is flagrant. I do not call upon the proprietors to sacrifice any thing, I only request them not to let a mistaken notion deprive them of the opportunity of doing good. It was the precept of unerring wisdom, "Let "nothing be lost." If, indeed, we can contribute to warm these our fellow-mortals, without at all diminishing the comforts of ourselves and families, surely the epithet *Human*, would be much too good for the mortal who could refuse it.

woodman's hands, yet it may safely be presumed to be more common to such as *have*. For when they meet with a subject, pliable enough to bend, it usually gets what they call a *Dressing*, (we should call it a *Trimming*, all the branches being lopped off;) after which, if it be *free-grown*, the greater part of the sap will ascend, and break out in shoots, at and near the summit, so as to occasion the tree to be top-heavy in the growing season. Should the wind blow furiously against one so situated, if it does not break, it may be expected to split; so far as amounts to a shake, or internal wound; which having once happened, can seldom heal; as the same cause, frequently recurring, will generally continue to enlarge it, in proportion to the increased size of the tree. But should it not recur, still the healing of the wound must take place the same season the misfortune happened, or not at all; as, before another, the two sides of the fissure would become too dead to unite; and, therefore, though no enlargement took place, such tree would shew an internal blemish when cut up.

If a tree, top-heavy, is subject to this sort of defect, certainly one which is not only so formed, but has the top more on one side than the other, must be much more liable to it; as the action of the wind, operating on one side only, will *twist* rather than bend it.

It seems a prevailing opinion, that wet soils frequently occasion this sort of defect; but how that should happen, except the situation is likewise exposed, seems difficult to prove.—On such, a young tree may be expected to grow more freely, than upon a dry one, in consequence of imbibing more moisture; and therefore it must be less of a woody nature, and, of course, more liable to be shaken or split by the wind's tempestuous blast. The method of draining wet woodlands has been mentioned, (p. 120,) and the method of pruning to be recommended, will, if adopted, go far to prevent the defect being produced by other means.

Trees, Ivy bound, may be considered as in a sort of imprisonment, and deprived, in some degree, of both bread and water. If we properly understand the manner in which a tree is enlarged annually, and the situation of the principal sap vessels, we shall readily comprehend the nature and extent of the damage done by Ivy.

The situation of such vessels has been explained, (p. 49—52,) and the annual circles have been mentioned, (p. 85,) but, as some persons still doubt if trees add one more annually, to the circles observed upon their ends, on being cut crosswise, it may here be well to explain how the fact may be demonstrated.—The method is this; take a piece of bark from a free-growing tree, in spring; say three or four inches broad, and as much in length; after which, no more is to be done to it, till the autumn or spring following, when upon taking off the bark all round the wound, it will be observed, that the tree has got an additional covering, or coat of wood, occupying the place the bark did the year preceding, the edges of which will project somewhat over the wound, and shew its shape, as clearly, *now in the wood*, as previously it did in the bark; the thickness of the covering will always be in proportion to the vigour of the tree.

Now except it could be shewn, that the situation of the sap-vessels, and the manner in which trees are enlarged, are different from what has been described, (which we believe will not be attempted,) it will be obvious, that after the Ivy has completely invested the stem, in all directions, its annual swell will soon occasion a tightness sufficient to prevent the sap vessels from performing their functions;

when the death of the tree must follow; its exit may be *slow*, but is not, on that account, *less certain.*

Of the remedy for this evil, it may be sufficient to say *here*,—Remove the cause, and, in most cases, the effect will cease; but should the obstruction, thus brought on, continue afterwards, the trees are to be treated as will be directed for others that are hide-bound.

PRUNING.

THIS important part of the subject has, thus far, been treated in rather a negative point of view; as almost every thing advanced serves, in some degree, to shew *what it has not done*, or rather the loss the country sustains, in consequence of its being LITTLE *practised*, and LESS *understood.* We come next to treat of it more directly, by shewing *what it may do*, including the means to be adopted, under different circumstances.—If, by attending to nature's operations, equally *simple* and *uniform*, we have been enabled to discover what is WRONG; the same sort of attention can scarcely fail to furnish clear ideas of what is RIGHT; the latter being only the reverse of the former.

Consistent with the above, it may be observed, that, as the wisest in all ages have deigned to gather instruction where-ever they could find it, so I am by no means disposed to reject it, nor to think the subject degraded, whether such instruction comes from the *cutting* of the woodman, the *hacking* of the hedger, the *necessities* of the cottager, or the *browsing* of the ox.

On this point it may be likewise observed, as a well known fact, that we are often indebted to extremely common, and even trivial circumstances, for the most useful discoveries. The rooting of a swine, for instance, is said to have furnished the first idea of a plough. The lifting of the tea-kettle's lid, by the power of steam, and the scorching of the incautious hand by its heat*, had undoubtedly happened thousands, nay millions of times, before any valuable hint was taken from either. Miry roads too have certainly been common, ever since the infancy of society, and yet it required the penetrating genius of a Brindley, to turn the hint to advantage. From them he discovered, that earth and water, intimately mixed, when sufficiently dried, became impenetrable by the latter. Hence the business of what is called puddling, in the construction of canals; earth being every where substituted for clay.

The use intended to be made of the foregoing observations is, to remind the reader of the incalculable benefit society has received, by attending to, and acting upon, the hints furnished by such common circumstances. It is not said that the training of timber is of equal importance with the invention of a *Plough;* but it may be asserted, that the country is quite as much interested in it, as in the use of puddle, or the application of steam. Indeed, its use and good effects are as fully ascertained as either of them. Every tree *with a clean stem*, from four feet and upwards in length, being completely a *trained one*; as unassisted nature forms none of the sort*.

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* An ingenious Brewer, in this neighbourhood, has lately applied this property to the cleansing of Foul Barrels, with the most complete success.

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* We expect numerous objections to be raised to this doctrine:—but such as are inclined to make them should first consider, *when* and *where* they have seen trees, absolutely in a state of nature.—Four means have been mentioned, by which trees, usually supposed to be in such state, get pruned; and we may add a fifth, which does more than they all, namely, *a limited quantity of air;* the consequence of trees standing near each other.—This certainly is one means of improvement; but we cannot admit trees under its influence to be strictly in a state of nature; as that can

It is proved then, that such practice has been abundantly successful, so far as it has been extended; to *it* we are obviously indebted, for most of the good timber we possess. Surely, then, that success is a sufficient reason to *extend* the practice. If a tree has been benefited in a certain degree, by clearing the stem, a few feet in length, undoubtedly the same, or similar means, extended higher, would have increased the effect.

In order to give a clear idea of what may be expected from a good method of training timber, the frontispiece is introduced; being a drawing of a Beech in Woburn Park; to which the Grandfather of the present Duke of Bedford is said to have paid very particular attention.

only imply free space on every side, for all the branches to grow; none being taken off, except by the winds. Firs in such a state, may rise, with a single stem, to a great height, *but produce no clean timber.*

It has evidently been a favourite; as the trees all around it have been cleared, for about twenty-six yards, to give it space. We may observe also, that the stem is in no place either *flat*, or *furrowed;* a sufficient proof that the branches were taken off at no late period. It is now in full health and vigour, and likely to continue so, for a century to come. There are several other Beech Trees in the Park, that seem little, if at all, inferior to it in weight, while, in every other respect, this maintains so clear and decided a superiority, that it furnishes as decisive proof of the beneficial consequences of training timber, as the most sceptical mind can require.

But, probably, the reader may ask, Will *Pruning* cause any deciduous tree to assume such a form? The question is fair, and the answer shall be explicit. *Yes*, any one that will grow; provided the business be commenced in due time. And we will add, that the process is quite as easy as to form the worst figure that could be sketched; and what is more, we have abundant reason to suppose, that the general weight of a tree will increase faster in such form, than any other.

We know that, in the case of any specific manufacture, the man, who can make the most and best work, of a given quantity of the raw material, is justly esteemed the best workman. Sap may here be considered as that material. Nature furnishes a certain quantity of the article, which, without our assistance, operates in producing either a tree or a bush; but, in most cases, its form must depend upon accidental circumstances.

It has already been intimated, that the natural form of trees is unfavourable to the production of good timber, because they produce branches as low as the head of the first year's growth ; and they again

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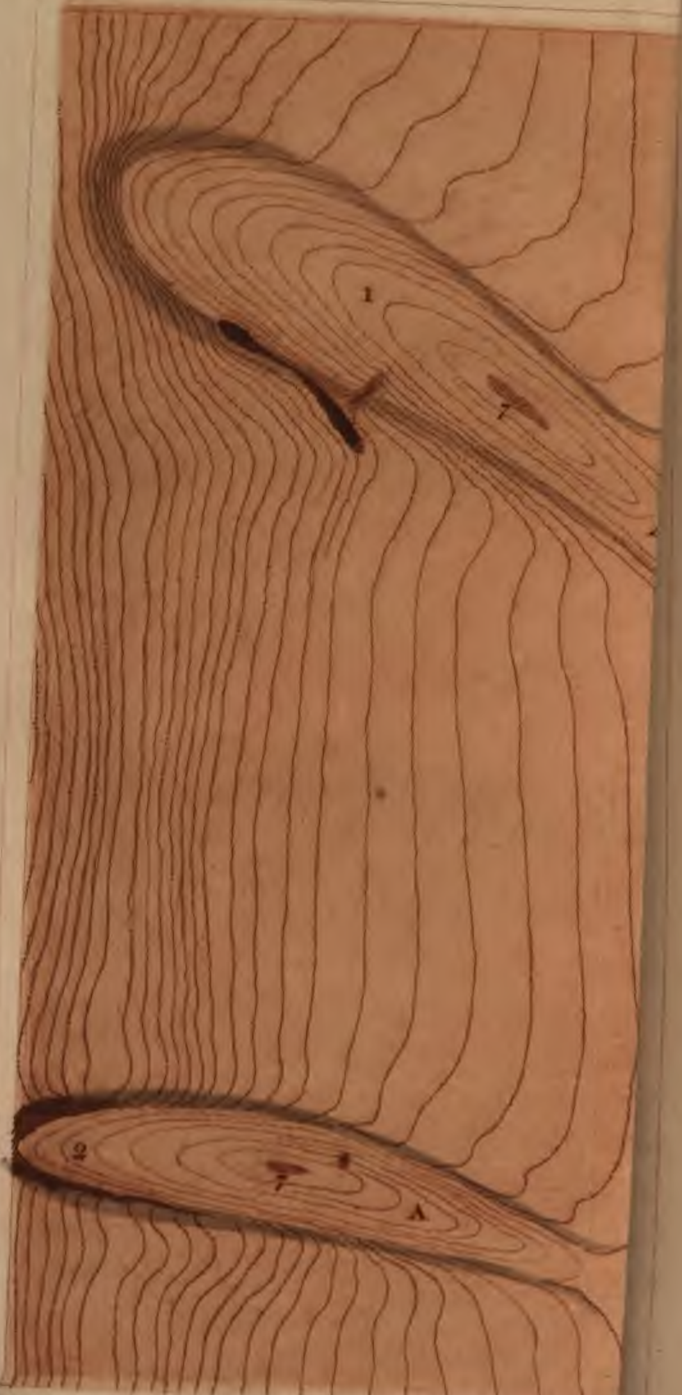
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produce more. Of course, the timber of such must not only be exceedingly *knotty*, but small in quantity; the sap being rather expended upon the branches than the stem; and hence, we see clearly the necessity of *using means*, in order to improve the quality, and increase the quantity, of TIMBER.

A slight inspection of Pl. III, A. A. A, will shew the manner in which the sap is intercepted by the branches, in its ascent. It is to be noted that the curved lines were, all in turn, at different periods, the situation of the principal sap-vessels. No. 1 gives a very clear idea of the manner in which either a branch or a tree is enlarged, by one coat of wood being annually laid upon another, likewise, we see, by the top of this figure, the manner in which the branches cause a contraction in the sap-vessels, as noted at p. 56.

Here it is well worthy of remark, that

so long as the branches are *alive*, and of course in need of *support*, so long nature administers it, by the sap-vessels going along, and round them; but so soon as they are dead, though remaining in the same place, such vessels, or caterers, take a different direction. See the top-parts of No. 2, and 3, where the branches have the bark remaining upon them, an evident proof that so far they were dead.—In a subsequent plate we shall be enabled to shew, that the direction the vessels take in the last instance, is directly calculated to heal the wounds, made by taking off branches.

This plate is an exact representation of a Larch Board; but it makes no difference, what is the subject, as the internal structure of all the trees we know of is the same. No. 4, is the curving, occasioned by a branch on the other side of the board; the dark part, on the right of the figure, is some bark which the plane has uncovered; we observe the curving, *at* and *about* that mark is trifling, but very different to the left of it; which evidently shews, that the branch was living in one case, and dead in the other. No. 5—5, are the bases of branches, that grew in different directions. No. 6—6, is the core of the tree, which happens to appear in these places only. No. 7. 7. 7, is the core of the branches.

Nothing perhaps more clearly demonstrates the first sort of damage done by useless branches, than the plate which has just been explained. We may, therefore, proceed to inquire, what purposes nature meant to serve, by *placing* branches upon trees; for if we possess clear ideas of that point, it will be known when they may be *displaced* with advantage.

Branches seem to be the means of producing, and maintaining a certain quantity of leaves; which act in a way much easier to *conceive* than *define*, in attracting the sap upwards. We know that through them, a communication is kept with the atmosphere; probably, they collect a considerable portion of matter from it. In fact, we believe that their assistance is absolutely indispensible; not only to enable the roots to seek what is necessary for themselves, and the other parts of the plant in the earth, but to enable them *to make use of it.* In theory, we cannot possibly suppose that Nature placed leaves on trees only to amuse *us*;—in practice, we find directly the contrary.

To prove the point, as shortly as possible, we may note, generally, that a tree divested of a considerable portion of its leaves, in the growing season, afterwards vegetates slowly. The case of gooseberries, infested by caterpillars, is directly in point; for though the fruit may have got to its proper size, when the evil takes place, yet, if any considerable portion of the leaves are destroyed, such fruit never ripens, so as to have its proper flavour.

The point too is recognised by every gardener, in managing his wall-trees. If he find any fruit upon a branch, beyond where leaves appear, he disregards or displaces it, knowing such cannot have a sufficient supply of sap, to bring it to maturity. The case of trees, infested by insects, again proves the point.—As soon as the leaves get unhealthy, and begin to curl, so soon the business of vegetation may be perceived to decline; and, as the mischief increases, that decreases, so as frequently to stop it entirely; in which case, the death of the plant follows of course.* The case of the Fly, in the hop-gardens, likewise announces the same truth:—trees being only a vegetable of a larger species.

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* The author had several hundreds of free-growing young Cherry-Trees killed, in this manner, in the summer of 1803.

Seeing then the uses of leaves, and applying the principle to the case of Forest Trees, it is obvious, such are necessary to promote not only the growing, but the towering of the plant; for the latter cannot be effected, except accompanied by a certain degree of strength, which it cannot have, unless some branches be suffered to remain to form a head, produce leaves, attract the sap, &c. as before intimated.

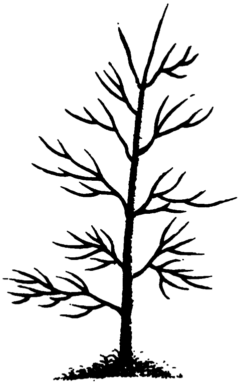
If such be the purpose which nature intended, principally in the formation of branches, it is obvious, that every succeeding year, the lower tiers, or annual sets, become less and less necessary to the plant; ultimately they must become useless, and not only so, but a nuisance, which ought to be removed; for otherwise, like the younger branches of a family, with wants increased, each would set up a sort of opposition to the stem: not with their own means, for such they can have none; but by intercepting, and converting to their own use the means that would otherwise nourish their younger brethren, and likewise, promote the towering consequence of the parent plant.

Observe, it is not said that trees require *all* the branches, and leaves, naturally produced, to be retained to form a head, but *some;* for experience informs us, that strength is gained as effectually by a few branches, so situated, as by many. And, upon considering what has been advanced, upon the subject of dead tops, it will be obvious, that a stem crowded in any one place, must always be detrimented in a greater or less degree; and that though branches are necessary in the way above stated, yet such as are somewhat small, if free grown, have uniformly answered the foregoing purposes, as well as the larger, and in other respects they must be preferable, as taking less support. The reason seems to be this, a quantity, just sufficient in the first instance, must, from its daily increase, soon become abundant; besides, every season the plant gets an additional set.

It is to be noted, however, that weak, hide-bound trees will require much more head than free grown ones; as, in the former, the circulation being obstructed, the sap requires a greater degree of attraction, than in the latter; and the *increase* cannot be great, so long as such obstruction continues.

Consistent with the above principles, there seems no difficulty, in directing a

Plate, 5th.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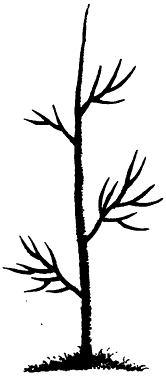
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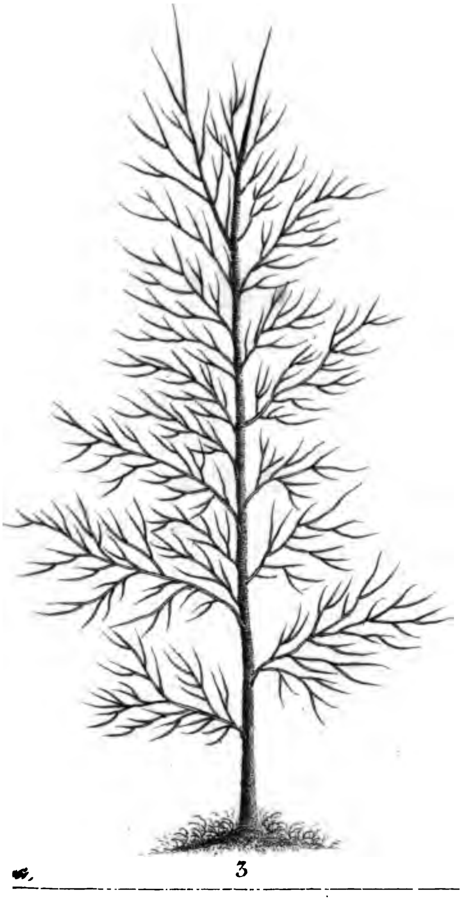
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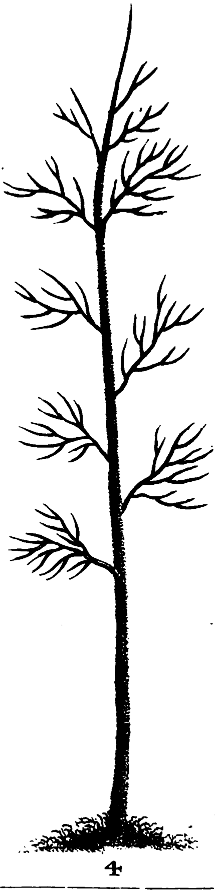
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good and safe method of pruning such *young trees* as are intended to grow into *long, clean, and straight timber.* For, knowing that our business is to consolidate nature's efforts, as much as possible, to one point, we consider branches as no further useful, than as subservient to the purposes of the stem; and finding that small ones are every way perferable to such as are large, the head and stem of the plant are constantly kept light, by *thinning* out *all the largest branches,* every time the tree is pruned.

Pl. V, is intended to give a more clear idea of the method of pruning such subjects. No. 1, is a supposed figure of a tree which has been planted small, and grown three or four years. No. 2, exhibits the same figure pruned. No. 3, is a supposed figure of the same tree, three years afterwards, and No. 4, is the same, or any similar figure, pruned.

It may be observed, that the round head of a leafless tree, with but a few branches, cannot be correctly delineated on paper, nor is it at all necessary; for these sketches, such as they are, will sufficiently show what is principally intended; namely, to convey an idea of the quantity, sort, and situation of branches which ought to be either displaced or retained; and, consequently, the proper and usual form of trees, both immediately, and some years after pruning. It is not at all necessary to be exact, as to the quantity of such branches, provided some general ideas are attended to; such as that, the *larger branches only* are to be taken off, while the smaller are to remain, not upon a few feet only, but a considerable length down the leader, never suffering a branch to remain, that is at all likely to attract an equal quantity of sap, and, consequently, become its rival.

It is unnecessary to give directions for the subsequent prunings, as the method above directed will be applicable, whether the trees are five or fifty feet in height; supposing them such as have not been previously neglected.

Probably, we may be here anticipated, by the reader's observing, that the means directed are exceedingly simple. Undoubtedly, they are so; and we trust too he will likewise observe, that much of their value must depend upon *that* circumstance. We are not to expect the nicety of Garden practice, to be introduced here; and therefore, in recommending what is *useful*, we have to consider how far it can be called *expedient*, or practicable, upon a large scale. A method, that is not at once simple, expeditious, and effectual, cannot be highly valuable, because few have the means, and fewer would find the inclination to practise it to any considerable extent.

We next proceed to notice the consequences, or advantages of this *very simple method*, in order to shew whether or not it possesses the other requisites, beforementioned. In doing which, we observe, in the first place, that the real, or pretended, danger, incurred by taking off large branches, is completely done away; provided the business is begun in proper time, namely, when a knife will perform the operation, and repeated every second or third year, till the stem is cleared to the desired height, as then the branches to be displaced must always prove somewhat small; and, therefore, when taken off close to the stem, the wounds will heal very soon.

In the second place, the stem and summit of the tree, having the advantage of the greatest part of the sap produced by the roots, will be abundantly better fed, than trees otherwise under similar circumstances, but not so pruned; and consequently, such plant will not only rise *freely*, but be STRONG in proportion to its *height;* and, as it rises, the length of stem will rise gradually, though not quite so fast as the top; however such stem will soon get a considerable length, upon any soil which can be called proper for the plant, as every pruning will increase it more or less.

Thirdly. Such stem will not only be long, but *straight*, *sound*, and *clear of knots;* to which we may add, that, in consequence of converting the sap into stem, rather than head, the greatest possible quantity of timber, which the soil is capable of, must be produced; in short, such method is directly calculated to insure to a tree the best, or most profitable form.

Fourthly. Trees grown in this manner require the least possible space; the branches displaced being not only the largest, but the most extended. Besides, when branches stand thick upon a tree, the head of which is of considerable length, the greater part must grow in an horizontal position; when they stand thinner, they will have so much more air, and light, above them, and hence, must grow proportionally upright.

Fifthly. Pruning not only improves the form, but increases the *size*, or *general weight of a tree.* To some persons, it is presumed, the assertion may appear paradoxical, but not so to such as will give due weight to the following considerations.

When a branch, or a number of such, are displaced, an extra quantity of sap is thrown into the remaining part of the plant; of course, it must increase its vigour. And not only so, but we are to consider, that any branch so displaced is a certain degree of obstruction removed, so far as the quantity of branches is more than necessary to the feeding of the stem. Whatever causes an increase in the vigour of the top of a tree, must do the same to the roots, which are in some sense no other than the *mouths of the plant*. The branches would not be seen extending themselves, quicker and further than ordinary in the air, if the root had not previously done the same in the earth. They are, by such means, not only increased in quantity, but have additional pasture, where they collect an increased portion of nutriment, which, converted into sap, will ascend to the head, and in doing so enlarge the vessels or conductors. An increased quantity, with an amended circulation of sap, amounts to what may not unaptly be denominated, an improved constitution; which repeated attention could not fail to preserve; and therefore, we are warranted in asserting, that, under such circumstances, the general weight of the plant would increase much faster than before.

To support the above conclusions, we may notice the gardener's old and standing maxim, as exactly in point:—" Cut " wood and have wood," or " Cut wood, " to have wood,"—is an idea, the propriety of which no one ever pretended to dispute; though the reason of it has not usually been inquired into. When trees are weak, they prune them severely, to increase their strength; and when they are the reverse, so as to be unfruitful, they are extremely sparing in that operation; knowing that otherwise an increased quantity of wood would be the consequence; and serve to increase the evil. Of course, we find the principle admitted, both in the case of strong and weak trees. It may indeed be considered as the polar star, by which every gardener does, or should, shape the course of his operations, in pruning fruit trees; and yet Mr. Forsyth, in his celebrated treatise on renovating trees, has either done, or *seems* to have done, his business without noticing it. But probably the omission was not altogether accidental, for had he once admitted the light such *star* or principle would have cast upon the subject, the intelligent reader would have seen enough to develope the causes of his *extraordinary* sort of successful practice. Certainly such *success* was no mean testimony in favour of the point under consideration.

The practice of the agriculturist, likewise, supports the maxim.—In the treatment of his hedges, he cuts down and plashes, (lays,) both young and old, for nearly the same purpose, namely to strengthen and renew them.

And the same truth is exemplified in

the business of woods. An old tree, in a languid state of growth, is cut down; such, for instance, as had made no visible increase, for many years; and yet its stump is afterwards found to have assumed fresh vigour, so as to produce, in a few years, a new and flourishing tree.——We easily account for all these results, upon the principle that pruning increases the *general weight of a tree*, while they are perfectly inexplicable upon any other.

Having now shewn how pruning contributes to increase the *general weight of trees*, we are next to examine how it *particularly* operates upon their most valuable part, the STEM. And we cannot do it better, than by requesting the reader's attention to matter of fact, at once curious and interesting, mentioned p. 55.—We there assert, what almost every tree of a tolerable age *proves*, namely, that they never taper more in stem, (except what is occasioned by the branches,) than what naturally follows from the bottom part, (say that above the swell of the roots,) being older than the top; which clearly demonstrates, that *extra branches* are a detriment. Most certainly, unassisted nature would form trees with little or no clean stem; and of course very little good timber would be found in them; while, on the contrary, we observe every tree clean, and nearly of one thickness, as far as *means* have been used to make it so; whether it be a few feet only, as in the case of those in the New Forest, Hedge Rows, &c.—or a great many, as in that represented in the Frontispiece.

Had we been left to *guess only* at the method, in which the stem of a tree is fed, or increased, the lower parts would have been thought to have monopolized by far the greater quantity of sap; and that its circumference *there*, would have increased much faster than where more elevated; but facts shew clearly the contrary; of course, every part is demonstrated to have been fed and increased exactly alike; and hence we have the sort of form and substance, most of all calculated to benefit.*

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* Notwithstanding the stir most authors who write upon Timber make, about growing bends for Ship-Timber, we believe little is hazarded by saying, that if plenty of *long*, *clean*, *straight*, *free-grown trees* could be got, there would be no want for crooked purposes. For as to knee timber, much of *it* must be produced under any system of management; and as to ribs, and every other article requiring a moderate curve, they certainly may be made not only stronger, but every way better, from straight wood than crooked; and provided that sort of wood was not so very scarce, they would also be made much cheaper in two respects; the first is matter of labour; they might usually be sawn at once, so as to require very little hewing; and certainly under such a process, much weight of wood might likewise be saved. The refuse of a ship-carpenter's yard shews the immense waste occasioned by cutting irregular bends to the desired curves. Boiling, and a screw apparatus, to form the bends, would at once make the "*straight crooked*," just in the way required; while the strength of the wood would be retained, instead of being cut across,

From the circumstance just noticed, we see distinctly the advantage of a clean stem; and, in part, the disadvantages of the reverse; which may be further eluci-

as must be the case, less or more, under the present practice. Indeed, this method would frequently occasion two other savings; as such, from their strength, might often be made lighter than the others,—this would reduce the expence of carriage; an item alone, in the case of ship-timber, that is sometimes equal to the first cost.

We have tried oak, ash, and larch, and find that with but little boiling, they easily bend to any given curve; and fix *in it*, as they cool.

Perhaps it may not be generally known that boiling seasons timber effectually. I have always heard such was the fact, and the following circumstance seems to prove it. When building a mill, about fourteen years ago, an oak, of about nine inches scantling, which had stood in the ground, intended for the reservoir, was cut down and left *there*, to take the benefit of *Watering;* where it remained upwards of five years. It was then taken out, and directly cut up, and boiled, for the purpose of cogging an iron wheel, which had previously required a new set every year.—Not more than four or five of the number, (sixty-four,) dated, by shewing that the quantity of branches may be such, as nearly, if not absolutely, to prevent the stems increasing in circumference. On this head the following experiments are submitted.

have yet failed; nor is it easy to guess when they will, as they wear much more like metal than wood;—perhaps, some part of the effect may be imputed to the *Watering;* be that as it may, the circumstance deserves attention; and the more so, because the tree was very young and free-grown.

We know of no way by which bends of tolerable scantlings (knees excepted,) can be produced, with certainty, and little trouble; but that sketched on Pl. VIII.—The bend is produced from a side-branch only, and *kept* in that state by the branches of the centre tree overhanging the stems of the others. The former should of course be trained with a flat bushy head.—If five trees were placed round one centre, and five yards from *it*, they would stand about six yards apart from each other.——This hint is given as rather *curious* than *useful.*——Evelyn, Marshall, Nicol, and Loudon, have all, in turn, advocated this business; Nature, however, has always, hitherto, frowned disapprobation; for in this respect, she is like the hunted hare; which *may* be driven from its haunts, but constantly returns, or tries to return, so long as life remains.

In the spring of 1803, a Poplar was disbranched, and its head taken off about fourteen feet from the ground, but no notice was then taken of its girt.—That summer it produced a large quantity of shoots, from every part of its trunk.—In the following winter they were cut off, and the girt was measured, being then two feet one inch, four feet from the ground; in order to ascertain how much it would swell under that mode of treatment, in one season.—The following summer it produced much the same quantity of shoots, as in the preceding; and in the same manner; which continued to grow very freely, till late in the season; during which time the trunk was frequently measured, without being able to discover that any enlargement whatever had taken place; nor did the least crack appear upon any part of it, except at the base of the shoots.

All the shoots being again taken off in

winter, as before, the produce of new ones proved much the same as in the two years preceding. The girt was again taken, October, 3, 1805, and proved rather short of two feet one inch and a half. The increase of nearly half an inch *this* year, was evidently in consequence of its being scarified, by having the point of a knife drawn through the bark, to the whole depth of it, from two or three feet above the girting-place, to the root; the width of the niche, the effect of that operation, corresponding exactly with the increase of girt.——This tree grew quite detached from any other, and had abundance of good soil and moisture.

Another Poplar, the girt of which was two feet two inches, three feet from the ground, was measured about the same time as the foregoing; its head and all the branches being left upon it. The girting place being some feet below any of the latter, swelled in the course of the summer to two feet five inches; its bark being all along full of cracks, evidently the efforts of nature to effect such purpose.—This tree was again measured, at the same time with the above; when the girt proved two feet seven and a half inches.—It grew in a pretty close plantation, where it had much less of soil, air, and moisture, than the other.

Now, taking it for granted that nature is uniform in her operations, we may assert, upon the above authority, that to have the trunk of a tree increase fast in circumference, the sap must be prevented from having too many outlets, or ways to escape; these we conceive to have been of the very worst sort, being through young wood, where the vessels were particularly open.—The first case was *full* of such *outlets;* and the stem did not swell at all, till the following year; and *then* but little, and only in consequence of the scarification; the latter had *none*, and it swelled abundantly. The former had *all* the requisites necessary to its thriving; and the latter had them only in an inferior degree; we see, however, that the most favourable circumstances balanced nothing against a *fundamental error*; the method of pruning was *bad;* inasmuch as it produced *small branches and leaves only*.

Numerous instances might be adduced, where ignorance or inattention produces cases wholly, or in part, similar to the above; but as they must all depend upon the same principles, it may be sufficient particularly to notice the case of Elms pruned to a very small head, which inevitably occasions this sort of obstruction. The plant is certainly so *notorious* for producing numerous branches upon its stem, that most people suppose the circumstance unavoidable; they tell us, that if such were cut off, another crop, not less plentiful, would succeed; and doubtless it must be so, if means were not used to prevent it.—To avoid the evil in an early stage of the business, would have been easy; the method of pruning previously recommended, being effectual in all such cases, provided one point be attended to; which it may be useful to remember in numerous others. When a free growing tree is observed to make shoots from the stem, it is a proof *the head is too little;* and therefore, at the next pruning, it should be left larger than before.—Experience is the best instructor in the matter of quantity.

The only way to obtain a clean stem in such cases, is by resorting to first principles. The violent means previously used, having turned the sap not only into new channels, but to purposes the least of all beneficial, nothing but gradual means can reinstate it in its proper course. The business may be tedious, but certainly not impracticable.—It is this; take off, *very close,* more than half the number of the largest branches, to about two-thirds of the height of the plant; and above *that*, the same or a greater number of the smallest; that part being intended to form its future head. This is to be done when they are not less than two years old. After another year's growth, the same sort of operation may be repeated upon the part intended to be the stem, and that may be followed by another annual dressing; when the whole of the remaining branches may be displaced.

It is not said that the above business, which is indeed like bringing order out of chaos, can be always effected in a given time; as subjects will materially differ; but that, if the means be persisted in, they will never fail, where the tree is young, or vigorous enough to deserve such attention.

If the object were the growing of Fire or Hedge-Wood only, perhaps the foregoing method of lopping Elms might be thought a good one, in some respects; but certainly it is one of the worst that absurdity could have invented, for the increase of timber. Were there no other means of preventing trees overshadowing the land, it would be some apology for persisting in so barbarous a practice, but as the fact is otherwise, it must be considered as evincing at once the want of taste and skill; the custom being equally disgusting and absurd.

We frequently see ashes, and sometimes oaks, *trimmed*, so as to appear no better, but often much worse than No. 2 on Pl. IV. — Here, every additional lopping leaves additional stumps; so that, at last, deformity stands conspicuous.——Such subjects, however, may easily be trained into ornamental figures, by thinning out part of the shoots, and letting the others remain to form a head. Every *other* attempt to improve them would be unavailing; because, though it might be possible to enlarge the length of stem in some cases, still such enlargement must ever remain too knotty, and otherwise defective, to be of much value.—The stem, usually a short one, is *all* the *timber* this sort of *management* produces.

PLANTATIONS.

Having said thus much of pruning, as applicable to the growth and improvement of timber generally, we now come to mention some circumstances peculiar to plantations, but shall first notice the reasons or inducements which Gentlemen have to attend to the business.

Plantations form one of the first ornaments upon an estate, and fortunately include likewise the comfortable and beneficial property of shelter; and, also, what is still more important, prove the best of all situations for producing a large quantity of valuable Timber.

To those who have been at the expence of making Plantations, few arguments will, I trust, be necessary, to induce them to follow it up with adequate attention. The act is certainly evidence of a portion of public spirit, as well as a proper sense of private utility. We trust there are thousands in the United Kingdom actuated by such laudable motives; nor can it be an arrogant presumption to suppose, that what has advanced, will attract the attention of a few hundreds of them, in the first instance; and, if so, the business of improvement will most assuredly spread: a beneficial example will be a moving principle, where a precept, equally good, would be a dead letter.—To such characters the author looks, with a peculiar degree of complacency and expectation. The spirit that first induced them to plant must, to be consistent, induce them to give his precepts A FAIR TRIAL.*

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* From the number of copies which have been sold, and the opinion entertained of their utility, by many of the first characters for rank and intelligence in the country, we may be assured that not a *few only*, but *many hundreds*, are now reducing the precepts here delivered to practice. Certainly, many such have already, in part at least, seen their beneficial effects; and hence the practice spreads in every direction. One, and one only, who comes forward as an author, *propria persona*, has lifted his pen against it in the way of argument. He gives us to understand, as a general maxim, (what we certainly should neither have understood, nor believed without some such help) that such a method must damage the timber because it causes the trees to grow too fast. But *verily*, if the "*Forest Pruner*" has paddled upon the *surface* of error, our *author* has plunged into the *stream*;—for, among numerous passages *equally valuable*, he *treats* us with the following:—"If we suppose that trees grow only twice as fast where the soil is prepared, as where it is not, then a plantation worth 100£. in fifty years, had the soil been prepared, would have been worth 200£. in the same time, or worth 100£. in twenty-five years. But every one will allow that all kinds of deciduous trees will grow *four* or *six times*,

To such as have inherited Plantations from their ancestors, we may likewise drop a word. For independent of the ideas of public spirit and private utility, they have a *call* (a powerful one!) to tend with care the objects of their ancestors' solicitude. If they had left a clause in their *wills*, that it *should* be done, the omission would indeed be considered as unpardonable; but certainly no such document is wanted, to shew that such was really their WILL! as every tree, so planted, is a living evidence of the interesting fact.—How often must such have gratified themselves with contemplating the GRANDEUR, shelter, and worth, which their works were adding to the domain. It is indeed obvious, that a planters' principal gratification must often be in the idea of benefiting posterity; and, therefore, that pos-

and often *ten times, faster* in prepared than in unprepared ground; and of course, *the return of profits will be correspondent!*"

terity must be truly ungrateful, which thwarts or defeats such benevolent design.*

That the foregoing digression is not *causeless*, will appear, by considering the wretched state of plantations, generally. Their three essential properties are, ORNAMENT, SHELTER, and USE; and, therefore, we see clearly to what points their management should tend. They are perfectly compatible with each other; and, hence, *where* they are not all attended to, less or more, according to situations and circumstances, we are fully justified in asserting such a place is MISMANAGED.

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* The treatment of the two poplars continued the same for two seasons longer, viz. until 22nd Sept. 1807, when they were again measured, and it was found that the dimensions of the former were the same as *before*, while the latter had increased in girt to *three feet one inch*. It had of course, in four years, considerably more than doubled its size, while the former had produced nothing but small branches, except a trifling increase the summer after it was scarified. This experiment certainly furnishes abundant matter for reflection; probably the attentive reader will likewise find instruction in it: it is, at any rate, a striking proof of the quick growth of the Black Italian Poplar in a situation generally considered as improper for the species, viz. on a dry hill, the soil of which is not more than a foot deep with a strong clay bottom.

It is true that, in some cases, these properties are not alike requisite; for instance, in low sequestered situations ornament is of little consequence, nor is shelter of much, so far as the surrounding lands are concerned; but even *there*, the trees should shelter each other.——The short rule, therefore, will be to consider how far the above essentials are necessary in any given case, and to regulate the species of management accordingly.

Suppose, for instance, a plantation, upon an elevated scite:—there, we are certain, shelter is necessary, in a twofold point of view, both to the trees, and to the adjoining grounds. And it may frequently be wanted to serve other purposes; as where it is wished to conceal the outline of an estate, a park, lawn, or field, or even that of the plantation itself;—to hide disagreeable objects; or make a cover for game, &c.——Here we have three distinct reasons for preserving shelter; and, therefore, one would suppose different management to be adopted, than where only one of them existed in a very slight degree. Instead of which, under the present system, the hill and the valley, the clump and the screen, are planted exactly alike, and similarly *treated* afterwards.

There is something in a plantation, properly sheltered, so extremely captivating, that it strikes alike the taste of the man of refinement, and the mere rustic. The first can always explain the reason of his pleasure, while the latter can probably do little more than feel it:—still their sensations prove the same point;—for the peculiar taste of each is gratified, in some degree; which leads to the obvious conclusion, that good taste is nearer akin to *utility* than is generally imagined. It is indeed next to impossible, that the mind accustomed to consider the difference between right and wrong, can be truly satisfied with any thing that does not, in a considerable degree, answer the purposes for which it was first intended. When a plantation, or a screen, requiring the foregoing properties, has got into such a situation, that the wind and the eye meet with but little obstruction in traversing it, from one side to the other, much of its beauty and utility is gone; and, therefore, good taste disowns it.

Now, as not only general taste, but the nature of the thing itself, points out the utility of shelter, it is, certainly, to be regretted, that due attention is not paid to make it permanent, in every place where required, so far as the soil will produce the means.—If I were asked the abstract question, "Which way can you *most* benefit plantations, at the *least* expence?" the answer would be—"By SHELTER."—To effect it, in the best possible manner, a planter should have a number of suitable plants, to grow *under* the principal ones, namely, sorts that will not only *grow* when so situated, but *spring afresh* upon being cut down or beheaded;* as, by means of such, the *shelter* may be preserved, so as to be permanent.

But we are not to expect them to thrive sufficiently, to answer the purpose, without *some* small degree of attention. If they were cut down three or four years after planting, and the other trees suffered to grow over them, they would be so far smothered, as to grow weak, and consequently do little service. It would, therefore, be better to let the whole grow together, for about six years; when the cutting of the underwoods down would be a sort of thinning for the others; by which time, the roots of the former would have got such a degree of strength, that if any tolerable attention be afterwards given to pruning and thinning the latter, the underwoods will grow sufficiently, to answer the desired purpose.

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* The sorts proper for this purpose are the Beech, Birch, Oak, Hornbeam, Horse Chesnut, Mountain Ash, Barberry, Holly, Box, Privet, &c. The Silver and Spruce Fir are valuable for the purpose, by having the leaders only displaced repeatedly.——The detailed method of planting such shelters may be found in *The Profitable Planter*.

It will be obvious, that attempting to grow too many principal trees, must derange the idea of obtaining underwood; —indeed it may be demonstrated, that such means not only do so, but defeat the intended purpose. Strength of stem is, as has been observed, essential to the thriving of every tree; which it cannot have except its head has tolerable free taking away, before any real profit can arise from them. Nor can we thin trees, of three feet apart, to leave them regular, at nearer distances than six feet; of course, three would be taken down, for one left. This would be doing by far too much, and therefore, the better way is to do it *irregularly*; and repeat it either the next, or the following year at furthest.

To treat upon distances here, may at first sight be considered as stepping aside from the subject, but certainly it cannot be altogether irrelevant to guard the reader against a capital and common error, in the very outset of planting. The real friends of the business can neither recommend, nor overlook what unnecessarily enhances the expence or leads to future mismanagement; because both operate directly as discouragements.

It has been said, that no parts are equal to plantations for producing a large space;—of course, as soon as the branches begin to interfere with each other considerably, it is time to thin or prune a plantation, but more commonly both.

The error of planting too thick is extremely common, and that as frequently leads to another; namely, the neglect of thinning; as by the time *it* becomes necessary, the thinnings can only be fit for hedge-wood, or the fire; and, therefore, in such cases, it is seldom done either in proper time or manner.

The difference between planting at three and four feet apart, is as 4840 to 2722; and still it remains to be shown, (for it has never yet been done), in what beneficial respect the former exceeds the latter; except on exposures and very bad soils, for a few of the first years, and producing the sort of thinnings we have described; which of course must be charged for exhausting the soil; and expence of taking away, before any real profit can arise from them. Nor can we thin trees, of three feet apart, to leave them regular, at nearer distances than six feet; of course, three would be taken down, for one left. This would be doing by far too much, and therefore, the better way is to do it *irregularly;* and repeat it either the next, or the following year at furthest.

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It has been said, that no parts are equal to plantations for producing a large quantity of the most valuable timber; and the matter is not difficult to prove; as *there* we have always plenty of subjects, placed in proper situations, or at suitable distances to work upon, which is never the case elsewhere.——The thinnings may be of considerable value, when the trees are only four feet apart; we can then have rails, spars, &c. At a further thinning, such value is again increased; which circumstance will be repeated, as the plants continue to increase in size; because a foot of thick, is of more value than one of small wood: the former is likewise much more saleable.

It is difficult, if not impossible, to make an estimate of the quantity of timber which may be produced from a certain quantity of good land, in a given time; but it is evident, that such circumstance will be affected by the depth, for two reasons:—the first is, the increased quantity which the roots have to work upon;

and the next, the different quantities of moisture. On thin soils, a tree will often be much stinted, in that respect, in the principal growing season, which can never happen in deep ones; certainly, on the latter, the plants will grow largest upon a given surface.—The subject is here brought forwards, to furnish some hints for fixing the ultimate distances of trees.

The current opinion upon this point, is, that, to grow large, they should be not less than forty feet apart; and if we are to take the idea, with the current practice, or rather the prevailing neglect attached to it, there may be good reason for such ideas; but, certainly, nothing which I have yet seen, has given reason to suspect, that any tolerable sized tree could require near so large a space, in a good deep soil; yet, undoubtedly, if allowed so much, a head would soon be formed to occupy the whole; but there is no reason why the business of vegetation might not be as well carried on by a conic top, as a flat one; pruning naturally produces the former, while it increases the height; and, therefore, exposes more surface to the atmosphere, than neglect.—It may be observed too, that provided the leader be kept somewhat clear, we have as yet no rule by which to know what height a tree may attain on a good soil.

It can be no matter how fast it towers, provided a proper degree of strength be taken along with it; and there can be no danger of *that*, where the head is never suffered to remain long, either close in itself, or crowded by others. On the whole, we think forty feet distance seems to rest on no better foundation, than an opinion, entertained in consequence of observing the large spreading heads, that are made by trees nearly in a state of nature; which is generally four times more than necessary; and therefore, have little doubt but twenty-five feet distance, would be preferable to forty;—the former would contain about seventy trees upon an acre, the latter only twenty-seven.

Perhaps, nothing relating to pruning requires so much experience, as the management of thinning, or distances;—and it is among the advantages which plantations have over other situations, that, where it is judiciously attended to, much of the work of the pruner is superseded. If the plants stand too thick, they will rise quickly, but slender; if too thin, they will rise but slowly, and produce spreading, bushy heads; these are the extremes of the case, and all our art lies in steering between them.

In judging what strength is proper for young trees, regard must be had to situations. In some they are liable to be much agitated by the winds; in others, very little. In a thick plantation, they may always be trained much weaker than in single trees, or hedge-rows. Generally, when a tree is not overtopped by others, has a clear space all round it, and is so stiff as not to be much affected by the winds, it may be said to be strong enough; but of that the eye will be the best judge.

When trees have been neglected, and are grown too weak, by standing close together, Thinning is the only present remedy, and should be done *gradually*; for, if the plants have long sheltered each other, to remove that shelter all at once, would let in the wind, and otherwise starve them, so as to *stint their growth* for several years.

It has always been thought difficult to explain clearly how trees are affected by sudden exposure, that have previously been sheltered. Undoubtedly, when the wind gets among slender plants, it not only bends and twists their stems, but sprains their roots, so far as in some degree to sprain, break, and disorder the sap-vessels.—We may observe too, that the bark of trees, which grow sheltered, is thin; and hence, the sap-vessels are near the surface; of course, many of *them* may suffer from exposure.—We know, besides, that heat is absolutely necessary, not only to put vegetation in motion, but to keep it so; and therefore, its increase will always be effected by the degree of heat.——We may observe, also, that furious winds never fail to damage the leaves of trees, in proportion to their flexibility.—And, therefore, in this warfare, the youngest naturally suffer most; which is peculiarly unfortunate, because they are the principal agents in forwarding the business of vegetation. On the whole, it is presumed, much of the damage done by sudden exposure, may be naturally traced to the above causes. But whether such be the case or not, the effect is exactly as stated, and the means of prevention the same; namely, *thinning*, and afterwards *pruning, gradually.*

When plants stand thin, so as to have short stems, with spreading bushy heads, the remedy is the business of Pruning only. Cutting off all the largest side branches, and encouraging but one leader, as has been directed for young plants, will, if repeated periodically, soon show the advantages of such means in a very striking point of view.——Sometimes persons are perplexed in choosing leaders for trees;—one may be the straightest, and another the strongest:—in this case, the point should be decided by considering, that we want one the most capable of attracting the sap sufficiently; for if that be done, it is of very trifling consequence, whether the leader stands only half upright, or perfectly so; as, by growing freely, it will soon ceasc to bend; and, therefore, we usually choose the strongest.

In pruning large neglected plants, for the first time, and frequently one or two further, we do not attempt to *make* good forms, but to put them in a condition to *grow* into such; and that can never be effected otherwise than by pruning, and uniformly admitting air sufficient to permit them to grow stiff, but not enough to cause them to grow bushy.

Plantations of deciduous trees are too thick, when many of the lower branches die annually; and too thin, where *none* of them are found in a declining state. The stem may be sufficiently fed, though the side branches grow but slowly.

It is impossible to be too particular in pressing upon the owners of plantations, the propriety of calling in the aid of so useful, industrious, powerful, and cheap an auxiliary, as Air. Too much, or too little of this article may be ruinous; while the due quantity, introduced, and kept properly in action, by judicious thinning and pruning, may so far influence the formation of the trees, as to reduce the latter operation more than one half; and, at the same time, materially forward the growth of the most valuable part of them. We may be sure such increase is considerable, when they are not only stiff, but towering fast; while very few branches require to be displaced. It is to be understood, that the benefit of air chiefly applies to the heads of trees; as we could never discover that a moderate share of underwood, growing among the stems, did any damage, by reducing the quantity of *air*, but the contrary. It is admitted, that such must, in some degree, exhaust the soil, but this is abundantly overbalanced by the advantages before noticed.

If the training of timber were really as troublesome and expensive as some persons believe, still there is a partial mode of doing the business, which may be practised to very great advantage. The method is to select, and mark such trees as are wished to stand longest, before the first pruning takes place. This, however, must be understood to apply, principally, to very thick plantations, as no doubt is entertained, but that trees, at four feet apart, would ALL pay for such attention; as, when pruned, they might stand to grow tolerable poles,—but those who choose it, may, however, attend to the selected plants only; thining out or taking off the heads of others, from time to time, in the way that has been directed.

As it would be tedious to thin the heads of Firs, in the same manner as deciduous trees, there is so much the more necessity to attend carefully to the matter of distances; for, where they are properly managed, the former may be trained with less trouble than the latter; because, in consequence of growing with closer heads, the lower branches do not enlarge so freely, in the first place; and are, likewise, for the same reason, subject to decay much sooner; and besides, they do not often form separate heads. To these we may add the circumstance of their sap-vessels being so large, that the ascent of the sap is not so much obstructed by the branches.—If the first pruning took place when the plants were about eight feet high, it might then be necessary to displace two, or at most three tiers of the lower branches; and two years further, two sets more of the same description: after which, intervals of three years might elapse between the prunings; never displacing more than two tiers at once, except more should prove dead.*

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* In the "*Transactions of the Society for the Encouragement of Arts, &c.*" Vol. XXIV. p. 68, we have a paper on the advantages and method of "*Pruning Fir Trees,*" by "*Mr. Salmon,*" surveyor and wood-agent to his Grace the Duke of Bedford, which clearly evinces the propriety both of pruning and cutting close. The opinion of a person so intimately acquainted with the application of timber, cannot fail to be conclusive on these points. Still I think his theory, both with regard to the quantity of tiers of branches to be taken off at once, and the periods to

It will be observed, that this method is calculated to grow the trees with a long

elapse between the prunings, is highly objectionable. For long observation has convinced me that taking a large quantity of branches from a fir at once, disorders it so far as considerably to retard its growth, even *in shelter*, and certainly, reducing such to two tiers of branches would, *in exposures*, be completely ruinous. The third tier from the top will certainly do more in the way of shelter, and in attracting sap, than the two higher ones, and therefore a tree or plantation pruned to three tiers, might be said to be in tolerable condition, while plants of the same age, docked to two, would be in a ruinous one. *Generally*, however, I conceive four tiers to be preferable to three, where shelter is little of an object, but where it is much so, have no doubt of it.

If a fir would grow as fast with *two* tiers only as a *greater number*, it would be highly improper to defer the pruning till they increased to *six* or *seven*, as directed; for even at *Woburn*, where the prunings from young firs double the expence of the labour, a ton of *poles* is of much greater value than one of *branches*.

It may be observed, from the Duke of Bedford's certificate, annexed to the abovementioned paper, that his Grace had *previously* entertained doubts of the bill, with a handle of a length suitable to his work:—this business can require no nicety, and hence the expedition; as every stroke may be made downwards.

It is impossible not to smile at the absurdity of writers, who tell us either not to prune firs at all; or not to do so, till "the branches shew evident marks of "decay;"—as a little of that much-neglected article, EXPERIENCE, would teach them, or any others, that if a branch were cut off while alive, the sap vessels would send out resinous matter enough to seal up the wound, in a way infinitely superior to human ingenuity. Nor need we be afraid of wasting such sap by a too copious discharge; as, if the winter operations be discontinued at least a month before the sap is stirring, and the summer pruning do not commence till three months after that circumstance takes place, there is no danger to be apprehended.—For not only is the end of the stump sealed up, but such sealing keeps it so much alive, that the wood, which afterwards grows over, always unites, either wholly or in part with it; so that, instead of defects, we have usually health and soundness, but *never*, except in the case of very large wounds, any thing of consequence enough to merit the name of detriment.

The bleeding, which seems to have alarmed Fir Pruners so much, has certainly been in consequence of taking off too many tiers of live branches at once; and that frequently in spring. A healthy deciduous tree, so treated, would expend part of its sap in branches *upon* the stem;—a Fir *throws it out* in a crude state.—Firs are sometimes seen so severely trimmed at *one* operation, that the heads are left too small to attract a reasonable quantity of sap; which circumstance, the sudden exposure fails not to increase. Frequently, trees, previously growing freely, are stinted in this way, and *never afterwards resume their former vigour.*

When Fir branches are left upon trees, for years after they are dead, it occasions rotten or *Cork Knots*, and a number of dead stumps, to be buried in the wood; which not only obstruct the sap, (as is evident, by the parts over the annual sets of branches being thicker than those between them, for many years after their being displaced,) but divert the grain, and consequently reduce the strength of the wood.*

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* The Sellers of British-grown Firs, well know that the Buyers make knottiness the leading objection against the article.—What shall we say then to the sort of *teachers* that have been just alluded to?—Only this: Begin at the right end of your work in future; *practise first*, and *write afterwards*; and then there will be little danger of your opposing, as in the present instance, not only the *interests* of the country, but TRUTH itself.

ORNAMENTAL TREES, &c.

In regard to the general methods of pruning, recommended, it may possibly be suspected, that they are only calculated to produce a *sameness of form*, which, it is admitted, would, in some situations, be highly disgusting; but certainly such idea is completely groundless, as the same principles, which instruct us how to conduct the greater part of the sap to one part of a tree, will naturally suggest the means of doing the same to another; and hence we easily cause it to grow freely, the soil being supposed proper,) in any form the mind can conceive, or the pencil sketch; provided such form be not incompatible with the free circulation of the sap. Hence, in works of fancy and ornament, we have very superior advantages.

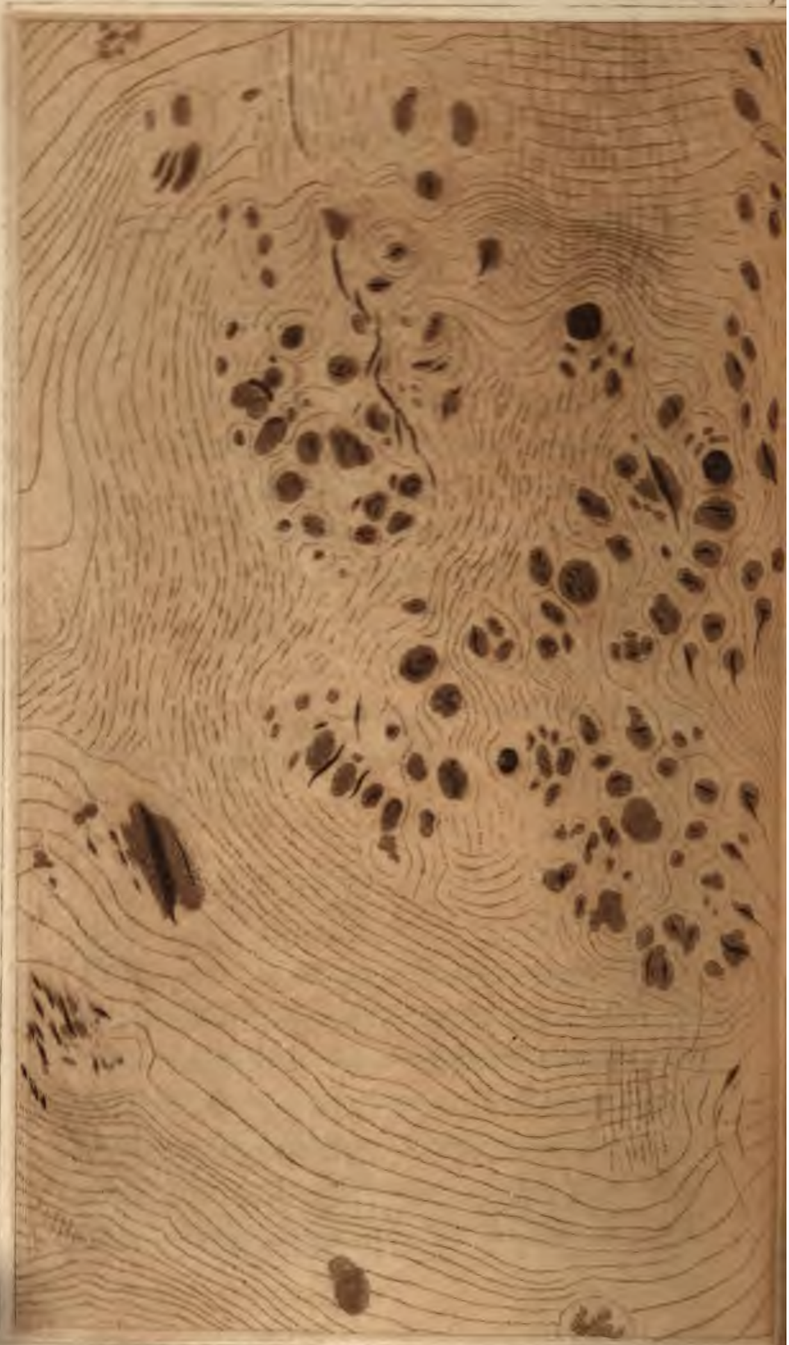
It is unnecessary to wait till blind chance shall dictate what sort of figure any favourite tree, or a number of such, shall assume. For, if it be present to the mind, a slight operation upon a young plant seldom fails to cause nature's efforts to tend, principally, to the desired point; after which, a few minutes attention, bestowed periodically, generally completes the business. Every single tree will be *a living picture;* nature will appear in her most imposing attitudes; while the skill which directed her efforts remains where it should be;—unseen,—almost unsuspected. Examples follow.

Short Stems, with Flat Heads.—Trees, for this purpose, must have no other branches taken off, than so far as is necessary to clear the stem to the intended height; as the side branches alone are, in this case, to form the head; therefore, when a tolerable quantity of these are from three to six feet long, the leader or leaders above them may be displaced; and if others afterwards take an upright direction, so as to overtop the rest considerably, their leaders must be treated in the same manner. We are not to expect the head can be kept exactly flat; but this treatment will so far encourage the side branches, and increase the number upon the summit, that the required form will not only be obtained, but easily preserved. If it be wished to cause such head to grow particularly thick and bushy; a few of the more *extended* extremities must be shortened, from time to time, to cause them to divide, and subdivide into numerous others. But if, on the contrary, such head is wished to extend considerably, then the *interior* part of the head must be thinned of some of the shorter and smaller branches; in consequence of which more of the sap will go to extend the extremities.

When we want *two or more stems* to be produced from one; whether near the ground or otherwise; the best general method is to train them from side ultimate height of the tree. Another hint, in regard to such a figure, is, that some attention should be paid to the forming of its top; this would best be done by selecting three or four side branches, which grow nearly at the same height; as, by that means, the sap, much reduced in quantity by the lower tier of branches, would require to be *equally* divided among the top ones. When treating of dead tops, it was remarked, that the danger from such circumstances was chiefly applicable to hard woods, such as the oak, &c.

The causes of DEAD TOPS have been particularly attended to, (p. 123—132). Their cure, *where practicable*, may be effected by the following means. When such happen to trees infested with unnatural branches, they must all be taken off as close as possible; afterwards, the trees should be scarified all the length of the stem. The track of the knife, or tool,

Plate. 7



made use of, must be through the bark, where it has been clear of branches; no matter though it may curve considerably. There should be at least as many incisions, as the tree is half yards round.

This operation can only be performed upon old, thick-barked trees, when the sap is stirring. Its effect is, the loosening of such bark; and thereby not only assisting the circulation of the sap, generally; but likewise opening it a free passage along the incision; as such would soon be filled with new free grown bark; underneath which, that fluid would pass readily to the head.

Pl. VII. is an oak board, cut from a tree, infested with unnatural branches. The dark marks are their roots in the wood. The grain, or sap vessels appear curving in every direction; in many places, more particularly near the bottom, they lie nearly across. On breaking the wood, just below this part, it was found the grain laid almost in an horizontal position, instead of perpendicular; consequently, very little sap could find its way to the head of such a tree, as, notwithstanding the root might furnish a moderate quantity, most of it would escape *out* of the stem. Every thing here shews that nature's efforts had got an improper bias; and that it was impossible any thing short of human means could have set them right.

When more unnatural branches appear, after the first set are displaced, they must be discarded also; and when such means do not prove effectual, the head of the tree should be thinned, by taking off part of the most extended branches, where they fork. In every case, the branches dead, or nearly so, must be taken off to the quick.

When dead tops appear on trees which

have none but natural branches, the lower tiers must be examined; if they prove in health, the case is evidently to be imputed to their intercepting the sap; and, therefore, some of them must be thinned out; by which means, not only a passage would be opened to, but an additional supply of it would be furnished for, the head. The latter circumstance might likewise be promoted, by first thinning the extended parts of the lower branches; and the head, *generally*, afterwards; if the foregoing should not prove effectual. In this case, the tree will prove bark-bound, *above* the obstruction; of course it should *there* be scarified, as in the former case. It will be obvious, that the means here recommended may be applied to the invigorating of weak trees in general.*

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* This very serious evil is often occasioned by the Designers of Grounds. Frequently they expend hundreds, sometimes thousands, in removing earth; in

From what has been said on the defect, it is clear that the best forms for single trees, (on bad soils especially), are such as divide into three or four principal branches, at or about the same height; having no general leader: for such will divide the sap most equally among them.

Sometimes we find young single trees of quick growing sorts, such as poplars, grown top-heavy. In this case, the more

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consequence of which, it happens that the trees left, or such as are ordered to be planted, appear more like the trees on the confines of a *Desert*, than such as ought to grace the cheerful haunts of affluence.

It is easy to *talk* about producing *effect*, as men do about pictures; it would not, however, be easy to produce a good one, if the colour shop were shut against the painter. The spoiling of the soil, or the introduction of improper sorts (or even sizes) of trees, puts the Planter in a similar predicament; which suggests this query:—Are not Designers, who have not a *considerable knowledge of execution*, as likely to *waste* their employers' money, as to produce the *effects* which *they* intended?

extended branches are to be shortened, close to the lateral ones. Where the branches stand thick, it may sometimes be necessary to *thin them*, by taking off a few of the larger, close to the stem. The head is thus not only easily made, in proportion to the present strength of the stem, but the same operation causes that strength to increase in an especial manner.

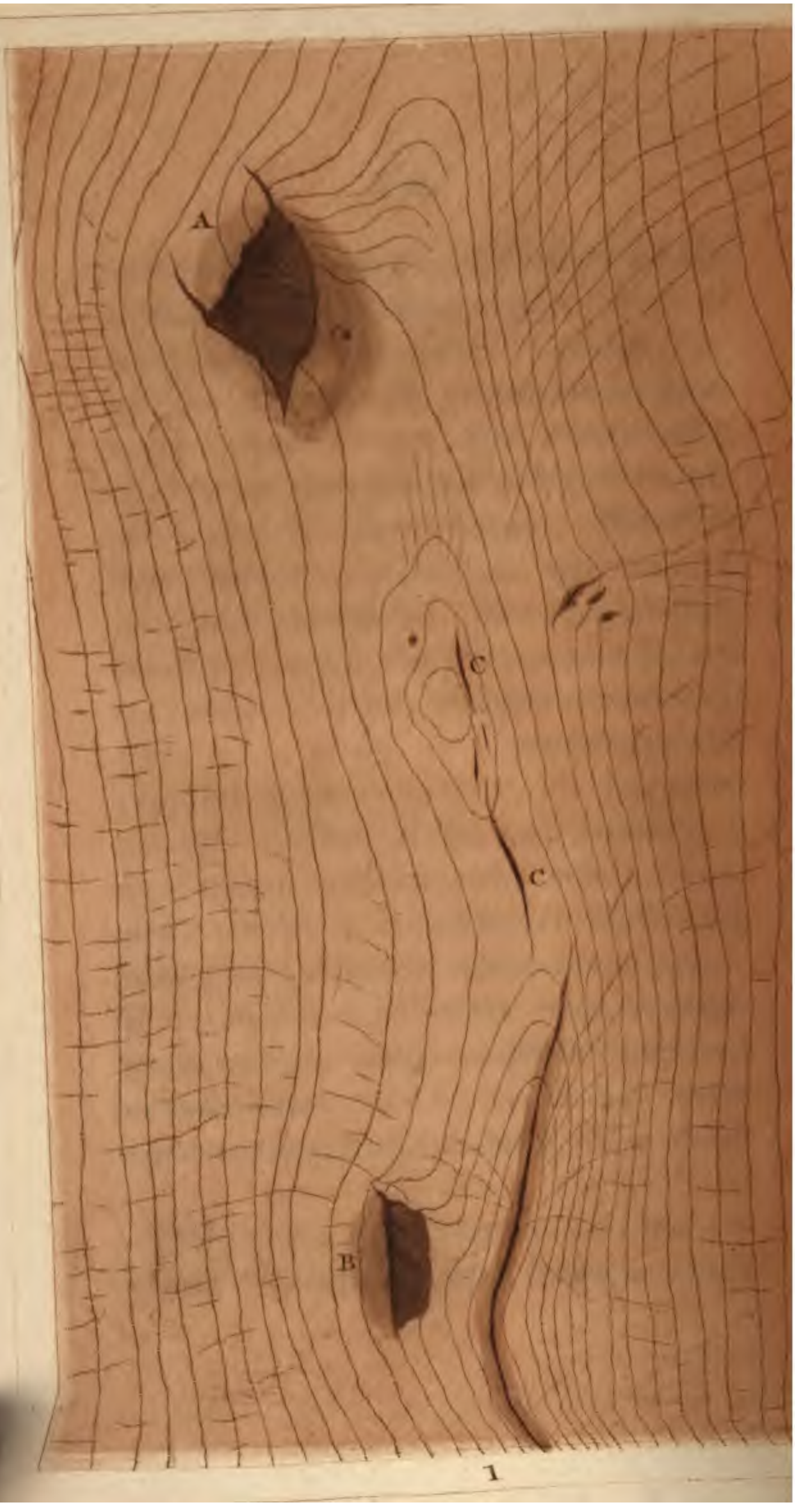
Frequently, the application of this art will go far to retrieve mismanagement, in regard to single trees, and groups, though considerably advanced in growth. It is not every planter that is skilful, either in the choice or distribution of his plants; nor do they always assume the *expected form*. To remedy such sorts of disorder is peculiarly the pruner's business; because he can in a great measure control the powers of vegetation, by reducing the size, and altering the form of most subjects which come under his hands.

Nor are the advantages of such scientific management at all confined to single trees, or groups, in ornamental scenery; for they extend equally to the close plantation. If we want certain species, or a number of such, to tower above the rest; or others to crouch beneath, the means are easy, and the effects certain. The closeness of front, the picturesque of summit, the shelter, and variety of the interior, are alike at its command.

In the SHRUBBERY too, its effects are powerfully apparent; as, where judiciously applied, these delightful combinations of art and nature are always *verdant*, —ever *young*. In short, whether we consider the facility with which a knowledge of the principles of vegetation can *create* —the certainty with which it can *preserve* —the means by which it can *renovate*—or the immense pecuniary advantages it is calculated to *secure;* it may truly be considered not only one of the most *delightful*, but the most *useful* of human attainments. And, certainly, whoever wishes to practise, either as a designer, a Planter, or a Superintendant of Ornamental Gardens, or Plantations, or even as a Woodman, must either study the means of directing, assisting, and occasionally controlling the powers of vegetation; or he can neither acquit himself with full credit, nor properly to the advantage of his employer.

Wounds.—The word conveys a very serious idea to the mind; and hence, we find them treated by superficial writers, with an attention, always *tedious*, often *absurd*, and generally USELESS. But though wounds, dangerous enough to deserve attention, may be inflicted sometimes, such never happens under a *regular* and good system of pruning, for three reasons. First, they are always small: secondly, they are inflicted upon healthy subjects: and, thirdly, they are made in a good form; consequently, none of them can require a plaister; because they will heal *quite as well*, most of them *much better*, without one; and, eventually, either leave the plant not damaged at all, or too little to deserve notice. Plate VI. shews the effects of wounds; one of which is of such description. No. 1, is a beech board from a very old tree; A and B, are the remains of two branches, taken off when it was small; as is proved by the situation of the core, C. C.—A. has been cut off, not very close, and therefore, a dead stump remains in the board, somewhat rotten; in consequence of having been partly exposed, about seven years. B has been cut off pretty close, and appears to have been completely inclosed in three years; and hence, though there appears some little deadness, all is *sound*.

No. 2. is a Larch board, that has enclosed the remains of a branch which



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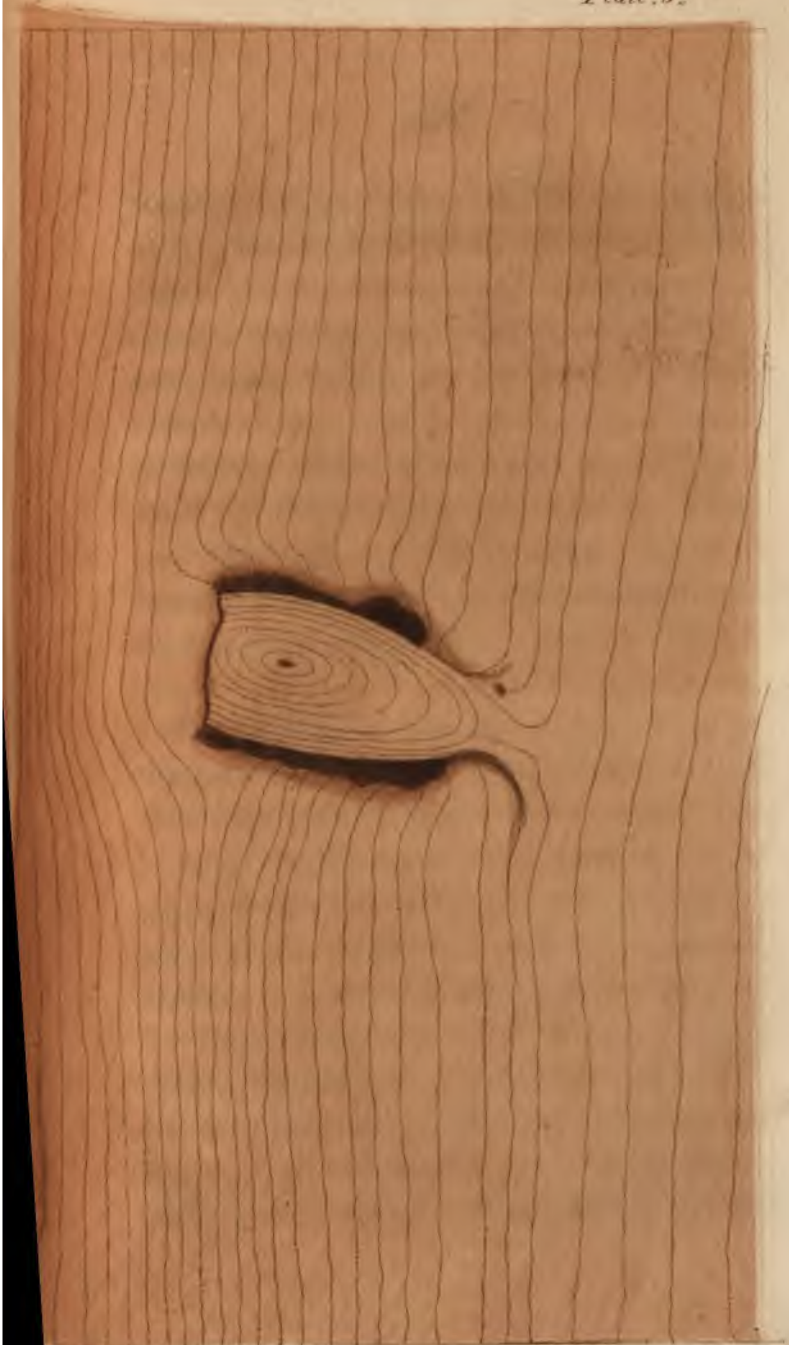

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seems to have been broken off, while alive; and such breaking occasioned the death of the stump, as it produced no shoots, but remained dead upon the stem, ten years, before it was completely inclosed. The sound wood joins closely to the end of the stump, and we have no more of defect than just its size. Had no stump been left, in displacing the branch, *it is evident the defect would have been no detriment at all.*

Here some of the advantages of pruning are clearly demonstrated, more particularly that of *close cutting*; as such wounds readily heal over, and in doing so, completely exclude the air, and hence prevent or arrest the business of putrefaction. A. would have been completely rotten, long before the tree was taken down, had not that been the case. We see too, how soon, after amputation, the veins or sap-vessels take a straight direction over the stumps; after which, all the wood produced must be perfectly straight, and equally clear of knots; except mismanagement should afterwards occasion the production of unnatural branches.— From such documents it may likewise be learned, *that no wound, of a moderate size, and proper form, inflicted upon a healthy tree, can possibly require the use of a plaister.*

The exclusion of air and moisture is certainly all the real service a plaister can render to a tree; and, therefore, where there is no danger from the one, there can be no *need* of the other. A wound, of *five or six inches* diameter, upon a healthy tree, will heal over before the stump decays; and such healing effectually prevents decay afterwards.

It follows from hence, that no other than large wounds, or such as are upon weak trees, can require plaistering; and even in such cases, the time of application ought not immediately to follow upon the infliction of the wound, except the stump or face of it has been previously dead; in which case, the same treatment will apply, that we have to recommend for others, some years after amputation.

Where plaisters *are* necessary, they should also be somewhat lasting. We cannot expect people to renew them often on forest trees; and, therefore, our business is to apply something, to effect the purpose at once.—Lead, admits of air, and often water; so that it is not always effectual: nor can Paint, Tar, or any such body, be of material service, if applied to a recent wound; because the end of the stump shrinks and cracks afterwards, so as to admit both air and moisture; and besides, such means obstruct the first efforts of healing. Without them, the first year's produce of wood must either unite with the end of the stump, or grow very close to it; and so far compositions can never do good.

For these reasons, it seems better to defer using any means to a live stump, till, at least, two summers have elapsed, from the amputation; as, by that time, nature would have healed part, and it might be judged how far such means were likely to effect the rest, before decay could take place.—*Then*, in doubtful cases, *and not before*, would be a proper time to fill the fissures with good Putty; after which, two coats of thick Paint, applied to the end of the stump, would effectually prevent decay, for many years; generally, till the wound itself disappears.

The foregoing will equally apply to wounds, made by disbarking trees, or branches blown off: it must indeed be a large wound, of these sorts, that will not grow over, upon a vigorous tree, provided all the loose bark is displaced, and the surface of the wood made somewhat even.*

If a public proof were required of nature's unremitting efforts, in this sort of business, the New Walk at York furnishes an excellent one. There the floods, bearing down the ice, have made terrible havock, at different times, in disbarking the Elms; and yet the wounds are all in a healing state, without the aid of Plaisters.

In quitting the business of wounds, we may mention a circumstance, which furnishes a useful hint to persons, who may experience the misfortune of having

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* At Longroid-Bridge, near this place, there is an Oak, which some years ago lost its bark on the south side, probably by lightning, seven feet six inches in length, and eighteen inches broad, in the widest part; the wound is now reduced to six feet long, and somewhat less than three inches, where broadest; the whole diameter of the stem, at the middle of the wound, is about four feet.—We are sure that nature has proceeded thus far without the help of any COMPOSITION; if the advocates of such *stuff* could shew they have ever done one tenth part as much without the help of *nature; then* they might have *something* to boast of.

To arrest the progress of Hollowness, the effect of rotten stumps, may be sometimes desirable. In such cases, the space must be probed to the bottom, and any quantity of water found in it, may be

valuable trees disbarked, *all round the stem;* a case hitherto deemed incurable.—Mr. Hargrove, Bookseller, of Knaresborough, had an Apple Tree so treated, to the length of half a yard, in September, 1802;—the only application then used, was a piece of matting wrapped round the wound; in which state it remained till the May following; when a curious expedient suggested itself to Mr. Lewis, an ingenious person in that neighbourhood. He cut a small scion from the tree, four inches longer than the wound, and inserted one end of such scion in the bark, at each extremity of the wound, in the manner of grafting. It was then covered with clay, which was tied round with a mat, and fortunately succeeded, so as to be a conductor for the sap. I examined it in October, 1805; found the scion considerably enlarged, the tree healthful, and was told, that it bore as much fruit this year as in any one preceding.

Undoubtedly, this instance proves what we have uniformly asserted, as to the situation of the principal sap-vessels; and, likewise, exhibits the advantages of either let out with an augur, at the bottom of such space, or dried out with cloths, where they can be applied. The hollow may then be filled with very dry sand, and its mouth plugged with wood. The plug should be driven, so as to be level with the inner bark; as, by that means, nature's efforts would not be obstructed, in growing over it. The fitting of the plug is not material, as it should be calked with oakum, to exclude the air and moisture, and afterwards painted over, as directed in the last case.

There is one standing and general prejudice, in regard to pruning, which operates very much to its disadvantage, by limiting the business to comparatively

scarifying bark-bound trees, in a very striking point of view. If such means could support the tree in the first instance, and afterwards invigorate it, so as to produce what has been discribed, we may easily suppose a large quantity of sap to ascend in the new wood, grown in the incisions made in the latter operation.

few hands; such as woodmen and hedgers; for no others are dexterous in the use of the Bill or Hatchet.

It is constantly asserted, that the use of a Saw is dangerous, except the wounds are afterwards smoothed with some other instrument; as, otherwise, they would never heal. In opposition to which we can safely affirm, that such danger amounts to little or nothing, when applied to the hardy foresters.

Indeed we know of no case among *them* where such smoothing becomes necessary, except where the head of an old tree is taken off somewhat level with the horizon: in this case, the roughness, left by the saw, must retain some little moisture, and therefore, would sooner induce rottenness. But this is completely different from taking off a branch, slopingly, either from the stem of a tree, or the side of another branch; as, in either case, the parts beyond the operation, attract the sap to the very edges of the wound, as already described; while, in the former case, we have nothing beyond the wound to cause such attraction; and, therefore, in old trees, they cannot heal. When such are made into Pollards, the idea of timber is gone; and, therefore, it is of little consequence if they afterwards grow hollow, as they may live in that state for ages. However, when persons are particularly careful of such subjects, cutting off the head, *slopingly*, as near a live branch as possible, and afterwards capping the wound with lead, is the best preventive of decay.

In every other case, where branches are too large for the knife, we find the saw not only the best, but the only practicable tool for pruning upon a large scale: (cutting down trees is another thing;) because it is expeditious, and any one may soon learn the use of it, so as to cut off the branches exactly to the required degree of closeness; which no person, however dexterous, can do with either a hatchet, or a bill. If we cut too close, the wound is much larger than necessary; if too distant, we leave a stump; the effects of which have been described;—and therefore, the cut is always made with some regard to both circumstances. Almost every branch has a little swell at its base; at the end of which the cut is invariably made, on small ones; on larger, where the swell is greater, we take *part of it*; see D. on pl. IV. marked in the manner such should be taken off; C. on the same plate, has less of swell, and, therefore, it is marked to be taken off closer.

For large work, the common carpenter's saw is the best; for smaller, one with somewhat finer teeth, the plate being about twenty inches long, is preferable. —It is almost unnecessary to observe this should be Steel; to prevent the loss of time in sharpening.

Another objection to the using of a hatchet or bill is, that branches *cannot* be thinned by *them*, without frequently damaging others by their *back-strokes* as well as their *edges.*—On the whole, as almost every wound, made under a good system of pruning, is so situated as to cast off wet, and have the sap flowing all round it; the smoothing of saw wounds is totally *unnecessary*. For these reasons, we know no way of doing the business, *expeditiously* and *well*, with any other instrument, except so far as may be performed with the knife.

In regard to the *proper season for pruning*, there is only one difficulty; and that is discovering the *wrong one*, or the particular time when trees will bleed. Considerable pains have been taken to ascertain this point, by pruning all sorts at all seasons, repeatedly; and only two have been discovered which bleed uniformly, at certain seasons, namely, the Sycamore, and Firs, as soon as the sap begins to move. The best and safest way is, to notice, in spring-pruning, if the trees bleed, (for it never happens at other seasons;) if they do, to desist, till, upon trial, it be found to have ceased.

As a general rule, we think *summer* is *preferable* to *winter*-pruning; because, in proportion as wounds are made early, they heal so much the more in the same season. From this rule, however, the case may be excepted, where the branches to be displaced bear a great proportion to the whole weight of the head; as there might be danger of the rest not attracting the sap sufficiently; yet that would happen only to hard woods, and trees not vigorous.

OAK TIMBER WOODS.

THESE are, confessedly, a species of property of much consequence to their owners and the nation. Their management seems to have been systematic and stationary for centuries; and, therefore, at first sight, might be supposed either too good to be improved, or not easily to admit of it.

The facts are presumed to be completely the reverse; and, if so, to shew, not only what is the operative part of such system, but its natural and uniform tendency, may be useful. If it be good it will stand that test; if otherwise, the sooner it is exploded the better.

Taking it for granted that the management of a wood should be influenced by the principle of Gain only, it will not be difficult to discover, that the system generally acted upon is not the best to promote that object; because it is materially defective in three essential points, besides others of less importance, viz.

1. The economy of sap,
2. The management of shelter,
3. The means of preventing defective timber.

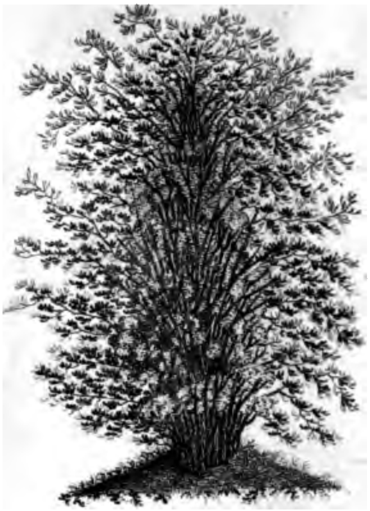
The importance of these particulars has been already mentioned, and, we trust, established; so that *here* it is only necessary to remind the reader of the circumstance.—If important in other situations, they are undoubtedly the same in a wood; this, however, seems the place where the two former are most of all disregarded.

Every thing we find in books, upon the subject, conveys the idea, that the system, as now practised, is some centuries old, which may be supposed a proof of its value. But this is erroneous; as it is evident, from the masses of timber found in old buildings, that, in this country, it was *once* plentiful. And, if such plenty were produced without *attention*, where was the need of *cultivation?* Under such circumstances, there was *convenience*, and hence propriety, in sweeping obstructions out of the way, at every fall. It was *then* of little consequence either when another might be ready, or what its produce; and, therefore, such *things* as the management of *shelter* and *sap* were never practised; probably never thought of.

Now, however, the case is materially different; the scarcity, and consequent value, of timber are seen and felt every where; of course, the management which formerly was *proper*, is now exactly the *reverse*.

Supposing the scarcity and value to be as asserted, common sense seems to dictate that, when a tree is cut down, the root of which is capable of producing another, some means should be employed to forward its progress. To the owner, it cannot be matter of indifference whether, before the period of the next fall, such stool produce one or two stout healthy trees, from twenty five to thirty feet high, or many weak *ill-formed shoots*, the best of which are aptly enough denominated *Wavers*.

Fig. 1. pl. VIII. gives some idea of the produce of an oak stool, growing on a tolerably good soil.—It is supposed to have grown from the last fall, without any sort of attention; and, therefore, supposing it a period which is common, about twenty-one years, or, at least, two-thirds of the average time which individuals enjoy their estates, we regard it as the beggarly produce of a system of absurdity, equally disgraceful to the national intellect and industry.—The sap which would have supported one or two stout, free-growing, young trees, has been squandered among a great number of shoots, collectively, and, individually, of little value upon any soil, but more particularly where it is bad; as there such produce, the bark



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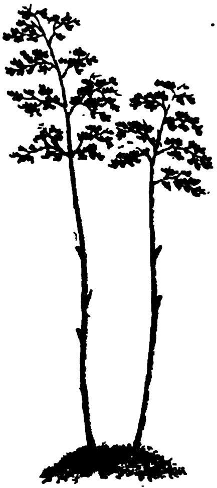

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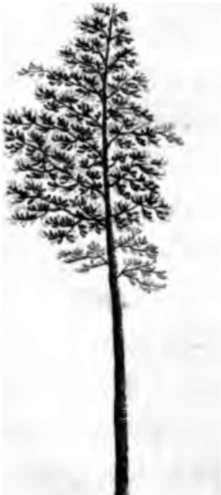

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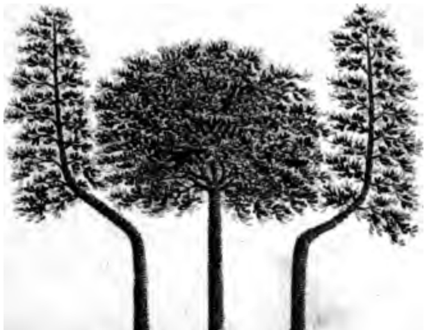

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excepted, is intrinsically worth no more than what it would fetch for hedging, the fire, charcoal, &c.

At P. 130—132, we have particularly noticed the way in which such method operates, in these cases, and the result we have as above. We cannot allow they are otherwise of value; because a tree worth five shillings may be raised much sooner, by displacing the whole, and paying attention to the next produce of the same stool. Under the present custom, however, the woodman has no choice, but to adopt the best shoots; or he will be no nearer his point the next fall than the present.

On better soils, the case certainly is somewhat different; but, even there, the value of produce, in proportion to what it might be, is trifling indeed; not only on account of being very small wood, but because the best of such is usually too slender to resist the wind effectually, and too much hide-bound, to attract the sap sufficiently. Hence, for both reasons, they are not in condition to increase nearly as fast as a pole, which has previously been trained with some degree of attention.—No. 2, on pl. VIII. gives some idea of such produce, (technically Wavers,) as usually dressed and *left* by the woodman.

The attempt to convey accurate ideas of produce is here unnecessary, as well as impossible; for every specific case must differ from others, less or more. But if *inattention* will, in any given soil, and, in a certain time, produce such figures as No. 2, *attention* would, in the same time, produce one equal to No. 3; and how much the latter is calculated to improve faster than the former, is left to be determined by the intelligent; supposing the constitution of each to be the same; but, knowing that this can never happen, we hesitate not to say, that, for several years, the latter must improve in value, at least *three times* as fast as the former.

Here we are willing to allow as much, in favour of neglect, as the friends thereof choose to claim, respecting the produce cut down in order to reduce No. 1. to the figure of No. 2. if they will allow a proper value for what must have been previously taken from the stool, No. 3; as that would at least have produced *one good pole.* But more of this when we come to show the manner in which such stools should be treated.

In the next place, we state, that under this system, the important matter of *shelter* is completely overlooked.——It is admitted, that Woods are not only sheltered for a few of the last years before a fall, but usually *too much so;* hence the greater damage is sustained, after the woodman has been introduced, with STARVATION at his heels.

At p. 198, an account is given (confessedly, in part, theoretical,) of the manner in which Wind and Cold operate on trees, so as to retard their growth; but we need not be anxious, whether such reasoning prove perfectly correct; as the fact now asserted is too obvious to be denied,—namely, that the starvation introduced into woods, at the falls, *stints* the growth of the trees, particularly the younger part of them, for several years afterwards.

That the warmth of the atmosphere in a wood, thick enough for the trees to shelter each other, but not so as to exclude a reasonable quantity of air, will be much beyond that of an open situation, cannot be doubted; no more than that almost every wood is, from its nature, capable of being maintained a permanent shelter.

The epithet *hardy* has been so constantly applied to the oak, that what is only true of the WOOD, is generally believed of the *vegetable;* hence, we very naturally overlook the mal-treatment to which inattention exposes it. But certainly the season in which it vegetates, or the circumstance of its first shoots being frequently destroyed by Frosts late in May, exhibits no proofs of hardiness; and the same may be gathered from the woodman's remark, that the bark is frequently difficult to take off in *cool* weather.—Nor does its being *found* upon very cold exposures prove the fact, but much to the contrary; "the starveling oak upon the "mountain's brow," is almost proverbial; it will *live*, but can never *thrive* in such a situation. The truth is, that the plant requires a considerable portion of warmth, not only to put its juices in motion, but to keep them so; as is proved by its appearance and progress in different degrees of elevation. The contrast between the plants, produced in the extremes of shelter and exposure, is indeed striking;

every thing being different, but the form of the leaves.

On the whole, little is hazarded in asserting, than an indifferent soil, properly sheltered, is capable of producing more oak timber than a good one, without this advantage; and if so, how can the woodman's system be defended? Most certainly, it *starves the tress* for *nearly twenty*, out of the first *thirty years* of their growth.

In the third place, we are to notice the defects which under this system the timber is subjected to. Here, to prevent repetition, we must refer the reader to the catalogue of the common defects of timber, exhibited at p. 48;—which are afterwards explained in order. When these have been carefully attended to, we may ask this important question, *Whether the whole, or any part of them, is guarded against by the system under consideration?*

We need not, however, leave the matter in uncertainty, as it is notorious that abundance of such defects are found in every wood; and so far from means being used to prevent them, their causes are so little known, that they are generally considered as natural, and of course unavoidable. If we could trace events to their causes, we should certainly find *much of the present scarcity of oak timber* occasioned by the species of ignorance now spoken of.

It fortunately happens that however much the three circumstances, which have been noticed, retard the growth, and depreciate the value of trees, *yet they are all such as may be avoided by a very moderate share of attention.*—We begin with the first, *the husbandry of sap;* which can only be effected by bestowing some attention to the stools, and trees, *periodically.*

The first dressing of the former should

take place after two summer's growth; at which time, from two to four shoots only should be left upon them; and these the strongest. Their situation should be such, as to divide the space round the stool, somewhat equally; as, in this manner, they would attract most of the sap; consequently, few others would appear afterwards.

The shoots to be displaced must be *slipped*, not *cut* off; for otherwise some part of them would be left, and readily produce others. The best tool for this purpose is a sort of narrow spade; *straight*, *stiff*, and well steeled; as the edge is to be constantly kept somewhat sharp, though rather thick. With this the shoots are readily slipped off, as far as the person can see where they spring: where he cannot, he has only to bend them down with his foot, and then he will easily see how to proceed. In this manner, a common labourer may perform the necessary operation upon a great number of stools in one day; it would seldom require *two*, to thin an acre.

These stools will require no further attention, till the end of two years; when they should be gone over, in order to displace any additional young shoots that may have appeared, and to take off a few of the largest branches from the others, with such as appeared to rival the leaders.

Two or three years after this, they may be thinned, by displacing the worst from each stool, which has more than two; and, likewise, one of the two, where the stools are small, or not vigorous.

At this time, they may be pruned in the manner which has been directed for plantations: indeed, afterwards, their management may be the same, with this addition; the stools are each to be reduced to *one shoot*, as soon as *one* is supposed capable of attracting all the sap.

When intended for timber, the best general method is, undoubtedly, to divert the whole sap of the stool into one tree, as soon as possible; because, as before intimated, the value of the article is increased in proportion to its thickness, till it gets to a tolerable scantling. At p. 166—170, has been shewn, how pruning improves the general weight of trees;—removing rivals from the same stool, will operate, in that respect, the same as pruning; and, therefore, the arguments and proofs brought forward upon that occasion, exactly apply in the present.

Unfortunately, however, the woodman's system, in *this*, as in most other matters essential to the free growth of the article, is defective. When he finds a large, healthy stool, being well aware one or two wavers would not attract all the sap, he very properly leaves more; the quantity being in proportion to the supposed strength; but here the matter of propriety ends; as, be they more or less, the whole are left to grow together, till the next fall.

The management of the Wavers are next to be considered.——The improvement being supposed to commence at a fall, the number of the Wavers to be left upon the stools, may be somewhat less than usual; because the means to be adopted, in conjunction with the preserved shelter, must occasion such to attract considerably more sap than common management.—They may then be pruned as directed for plantations.—These must afterwards be reduced to one, on each stool, in the same manner as in the last case.

The Reserves, or trees one fall older

than the last, may be treated the same as such subjects in plantations; and the same may generally extend to the trees which are older, with this addition,—that such as have *large spreading heads* should have *them* reduced, by taking off part of the most extended branches, where they divide.

At p. 132, the nature and tendency of this sort of defect is sufficiently explained; and, therefore, it need only be noted here, as particularly common and detrimental in woods already thin; for its constant tendency is to increase the evil. Reducing the heads, not only prevents such increase but benefits the trees, (see p. 166;) while the Bark and Wood, thereby produced, create a fund, to discharge part of the expences to be incurred by the general improvement.

The *shelter* of a wood is to be preserved, first, by the partial cutting of the underwood; *that article* should, in every case, be made subservient to *this purpose.* No other rules can, or need, be laid down for the business, than that so much is to be *constantly* left, as will materially check the currents of the winds, while *none* is to be suffered to overhang or crowd the produce of the stools.—If the latter, jointly with the underwood, produce shelter *below*, the trees would shelter each other *above;* as, under a good system, there would be many of different heights, each having a moderate top, none a large one.

If the management of *sap* and *shelter* be properly attended to, they will include the third point, namely *the prevention of defective timber;* except so far as relates to Draining, &c. which has been adverted to, p. 120.

As this outline includes the idea of taking-down the timber, whenever either its own *fitness*, or other circumstances make it desirable, rather than at regular periodical falls; to bring such obvious advantages within reach, it would be necessary to have a few permanent Roads in a wood; some principal, and others inferior; both for the purpose of inspecting the timber frequently, and getting it out when fallen. The space sacrificed by making such roads would be extremely trifling, as the roots would occupy the whole of the ground, and the tops of the trees nearly all the space above them. The roads should curve, so far that the wind could not traverse them any considerable length. With the help of these, every thing recommended becomes easy; without them, all would be difficult, if not impracticable.

The Roads or Rides in a Wood are likewise no small acquisition, when in the neighbourhood of a Mansion; being equally a refuge from the summer's heat, and winter's cold. They also bring the proprietor acquainted with what his woods contain. In short, to persons of opulence, who are proud of such property, a system of this description must be peculiarly gratifying; as, in addition to every other advantage, it affords the means of producing, in a given space, the greatest possible quantity of fine timber.

To proprietors, under different circumstances, it has also strong recommendations; as, in addition to increased produce, as before-mentioned, it gives the facility of taking down, annually or otherwise, just so much as may be deemed prudent, without the reproach of poverty following it: for if a Wood, on a tolerable soil, and not deficient of plants, had been managed a dozen years according to this system, no man could say, with truth, it was in bad condition; though there might not be a tree left in it worth forty shillings. It could not, indeed, be said, to be *then* highly valuable; but we might affirm it was in such a state of cultivation, that it could not fail to become so, in a short period.

Having now given what may be called the Outlines of an improved System for the Management of Oak Woods, it may just be observed, that the advantages are by no means confined to these of a pecuniary tendency; as a wood, so managed, would perpetually present a piece of natural Scenery, every way perfect in its kind. It is true, it would want, what a certain *Improver improved* would call—*Sublimity*,—namely, ROTTEN trees;—and so much the better. An object naturally Beautiful, or Grand, is doubly so when it is also *useful*.

In considering the immediate and more distant tendency of such a system, with a view to anticipate the objections to which it may be liable, we do not discover any, (the idea being strictly confined to Timber Woods;) except the matter of Expence.—On this head, it may be observed, that such cannot be considerable; but, even supposing it were so, still the improvement proposed is so far permanent, as to be tantamount either to the purchase of an estate, or the improvement of one in possession; the returns from which are never *immediately* looked for. In this point of view, we know of no improvement, usually practised upon estates, likely to make such an abundant return; yet, if the matter rested here, it would want a prevailing recommendation,—that of being *immediate*.

Fortunately, however, this improvement requires little from the proprietors, except the resolution to do it justice; for if a particular expence be incurred, there are also certain sorts of produce to be reaped, which would not at all reduce the general one. These alluded to are, first, The value of the bark and wood, produced in reducing the heads of the larger trees:—secondly, The value of the whole of what is pruned from the other descriptions of trees, the stools included:—thirdly, The amount of the sales of poles, produced by reducing the shoots or wavers, on each stool, to *one* only.

On these three species of profit, we may generally observe, that as, in every case, the sources from whence they spring, would be much improved by their being so removed, they are clearly the produce of the new system, and ought to be applied to its support.

We have, likewise, a fourth species of produce, which the system naturally creates; namely, The accumulating interest upon the sums produced by the sale of trees, taken down before what would have been the regular fall. The matter will be best explained by supposing that fourteen years before the regular period of a fall, many trees are discovered, which are no longer improving. In that case, if they be taken down and sold for any given sum, a hundred pounds for instance, there would be a clear hundred pounds gained; as the accumulating interest upon any sum doubles it in fourteen years. If it be objected *here*, that by taking down the trees early, we lose the increasing value of the article; the answer is, We have the space they occupied, and the produce from their stools, to balance against that circumstance.

We state the extra species of produce the system must naturally create; not with an intention of estimating its value, for that is impossible, as it will scarcely, in two cases, be alike, but in order to give proprietors an idea of the *real* current expences; it being necessary to furnish as correct an estimate of them, as the nature of the case will admit of.

It being obvious that such expences must depend much upon the quantity of the trees and underwood, as well as on the quality of the soil; and the price of labour, very considerable latitude must be allowed to meet these circumstances. On mature consideration, we think cases may differ, as much as one to three, and, therefore, three shillings is mentioned as the lowest, and nine as the highest, annual expence, per statute acre, upon this species of management. Of course, intermediate cases would require different sums.

We may, certainly, consider the *greater* expence as the *least* formidable, for wherever a wood is so situated as to require such expenditure, there can be no danger of its being more than defrayed by the means mentioned. Indeed, we see no reason to suspect *any* woods, so managed, would be found in debt at the endof twenty years, except such as are on very bad soils; and, as to *them*, it is certain they never can be of considerable value, without some such species of management.

The subject being now brought to the close, the reader is apprized, that, as it was not undertaken upon any other consideration, than a full conviction of its utility, the writer feels a considerable degree of solicitude to impress the same sentiment on others.

Conceiving that, in the British timber owners, he is addressing a body of persons, whose education and rank in life place them above the suspicion of narrow prejudices; to these he can appeal with confidence: no argument is necessary to shew that they have an interest at stake, and, therefore, a duty to perform; —namely, to use such means as are always within their power, to determine this very plain question. Is their timber properly managed, or is it not?—They will consider, that, though the author has an interest in promoting the cause of truth, he must inevitably forfeit his professional reputation, by disseminating the contrary. He therefore maintains the negative of the question, and has given his reasons, at length;—these are such as every intelligent timber owner has an opportunity of comparing with the continual operations of *nature* and *neglect* among his trees. The spirit which dictated the work naturally wishes for publicity; but if it bear not every impartial test, to which it is subjected, let it sink into that oblivion which such temerity deserves.

The last point to be noticed is one which has had considerable weight with the writer, namely the present scarcity of Oak Timber. For if the channels of public information be correct, there not only exists a great, but an alarming deficiency* of this article, for the supply of the Navy; and if so, the yards of the merchants, we may be certain, are but scantily supplied. Now, supposing this the fact, (and we think the document inserted below, reduces the matter to certainty), something is necessary to be done in order to arrest an evil, which appears not only increasing, but to threaten consequences too serious for an Englishman to contemplate with indifference.

---

* The following is extracted from a report of Lord Melville's speech, in the House of Peers, (1805), respecting the State of the Navy.

" He would say one word on the supplies of stores " in his Majesty's yards. He wished ever to have " three years' supplies in hand. He had used his ut- " most exertions with that view; but all that he or " any one could do, for the present, was only pallia- " tive. The evil which threatens the Navy is prodi- " gious:—one great cause of it is even connected " with our prosperity and *greatness*. The growing " state of agriculture is injurious to the nurseries of " timber; whose slow produce is not so tempting as " the produce of grain and cattle. The danger " presses hard. All men should come to it with one " hand and one heart; willing to make sacrifices, not " only of their other interests, but even of their par- " tialities."

If the circumstances disclosed in the last two months be attentively considered, they lead to this interesting conclusion, that if our country *cannot*, or *do not*, maintain the *empire of the seas*, we shall soon have neither *country* nor *empire* to maintain.

The plain fact is, that we cannot exist, as a nation, without ships, both for War and Commerce, and these cannot be constructed, nor maintained, without immense masses of Oak Timber.

It will be observed, that while the statesman (whose opinion we have quoted), asserts the prevailing scarcity, he attempts to explain the cause; but here, we presume, his conclusion is erroneous; because it cannot be shewn, either that any considerable portion of Land is *now* devoted to Agriculture, which previously produced Timber, or that the article is now worse attended to than formerly; nor does it appear that any considerable part of agricultural implements is made of Oak; nor that Agriculture has so engrossed the labouring part of the community, that less of the article has been planted in the late than former ages: and, therefore, it is evident the scarcity is not to be imputed to our "*Agricultural Greatness*."

The fact seems to be this:—there has been *no material increase in Planting it*, (certainly no improved general management has been adopted) within the last 150 years; in which time, it is indisputable, that *we have increased prodigiously in Naval, Commercial*, and *Manufacturing Greatness*; all of which occasion constant and large demands for the article; while it does not appear that the supply has *increased* materially, *if at all*; and, therefore, the scarcity is the natural consequence of such demands.

Still, with a full conviction of increasing scarcity, we think that Government has the means of retarding, and ultimately arresting its progress, by a proper appeal to the spirit and interests of the country. The means may be mentioned, without having too sanguine an expectation of their being adopted.

Suppose then, a Committee of Timber Owners were appointed to examine into, and report their opinion of the present method of managing Oak Woods; and also, what appeared the most *speedy means* of improving them. If improvement were thought practicable, returns might be made of the quantity of such woods in every township, with the names of the proprietors; each of whom should have the substance of the committee's report transmitted, with an invitation to sign an engagement, (no otherwise binding than upon honour), stating the quantity of acres he proposed to cultivate, in the manner recommended. A good method once adopted, through such influence, would afterwards sufficiently recommend itself.

Government should, of course, set the example; by putting the whole of the Royal Forests under such management, so far as applicable.

It is almost unnecessary to mention, that such Committee should meet in the country, where Woods, of different ages, were near at hand; and that they ought to call in such persons, to assist in their inquiries, as they might deem necessary.

There is nothing in the business proposed which presents the least difficulty to Government, nor any thing objectionable to individuals; and yet it seems, at least, highly probable that much good might result from such an enquiry; as, *in Woods*, it is not only *possible*, but *easy* to DEMONSTRATE the *impropriety* of their general management; and, consequently, that *improvement* is equally necessary to the National and Individual Interest.

It is admitted, that such means would not produce immediate plenty or cheapness; for nothing short of *coercion* (ever hateful) could do that; but they would very soon exhibit an *abundant supply*, in succession; which would not only be an inducement for proprietors to take down timber more liberally, but, in some degree, be the means of keeping down the price. With *abundance* in prospect, it could not advance so fast, as with nothing but *increasing scarcity* in view.

The encouragement of planting the article is certainly desirable; still that is only a distant resource;—it might, at some period, help the above measures, *but can never be a substitute for them.* It is impossible to assert with truth, either that there is a scarcity of Oak Plants or Trees, of some description; or that the soil and atmosphere are not generally favourable to the production of that species of Timber. The truth is, that *the scarcity is clearly to be imputed to the neglect of culture, with an increasing demand.* It is, therefore, necessary, that "all men should, "with one hand and one heart," adopt improvement. Certainly, themselves and posterity have much to gain by it, while nothing is required of them, which is difficult; little to be parted with—except their prejudices.

Finally, in addressing Timber Owners, it may be observed, that should the influence of Government be wanting, and no general improvement take place, individuals will have so much the more interest in attending to the business. If a few improve the quality of their Timber, they will improve their own market, in proportion as they depreciate that of others.

But they have a much higher inducement.—The splendid Victory, lately achieved, has proved our Wooden Walls to be an essential part of the Title, by which, not only *Estates*, but every species of property, is held. Let, then, all, who are anxious to preserve their property, remember the last order of that Patriot and Hero—THE IMMORTAL NELSON.—Let it be considered as addressed to every individual, as well as to our invincible Tars:—Let it be re-echoed in every part of the United Kingdom;—Let it be *especially*, and *perpetually*, sounded in the ears of British Timber Owners,—"ENG-"LAND EXPECTS EVERY MAN TO DO "HIS DUTY!"

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ERRATUM.

The note in page 186 refers to the experiment related in page 176, and should have been inserted there.

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Sir,

The following Hints have been chiefly suggested, by lately reading a very ingenious paper, "on the causes of decay in wood, and the means of preventing it," communicated by you, to the Bath and West of England Society, for the Encouragement of Arts, Agriculture, Manufactures and Commerce; and recorded in the eleventh volume of the "letters and papers," selected from the correspondence of that society.

It is, I believe, about fourteen years ago, that the Bath and West of England Society offered a premium, to any person who might invent a cheap and durable paint, for the preservation of wood-work exposed to the weather. Having for a long time practically attended to the subject, after a variety of experiments, I was enabled to offer a composition, at the very low price of half-a-guinea per hundred weight, of which there were considerable quantities sold, to the gentlemen in the environs of Bath, where I then resided: and to all of whom it gave satisfaction. Having from that period occasionally pursued the subject, I have lately established a manufactory in London for various kinds of cheap Paint; and flattering myself that it may be of some use to the public, I shall take the liberty to make a few observations on the paper before me, connected as it is, with my present pursuits, leaveing the *causes* of decay, which you, Sir, have so ingeniously and philosophically examined, and content myself with only pointing out, the different materials used for the preservatiou of wood-work, and laying down a few plain rules for their application. In suggesting this, no injury can accrue to the practical painters, many of whom I have the pleasure to rank among my friends; as it cannot by any means supersede their art; because in all house painting, and other work, where neatness is required, habit and experience are necessary to give that finish, which those who are unaccustomed to the business cannot perform.

There is no doubt but the consumption of all kinds of timber in this country increases rather than diminishes, as well for architectural, as for naval purposes; and this, together with the high price of that article, and the difficulty of procuring it, from the countries from which it has been usually imported, make it the duty, and interest of every one, to use means for its preservation; the want of a due attention to this, being often the cause of a much greater expence, by rendering a renewal of wood-work absolutely necessary; whereas, it might have endured much longer, had it been covered occasionally, with some substance, to preserve it from the effects of the weather. This is particularly the case in warm climates, and with shipping: where paint, or other substances, should never be spared from an idea of saving expence, as the sea air, together with the influence of the sun, and the water, necessarily destroy the essence of the paint in a short time.

There are two evils, to, which all paints are liable, both of which it is highly important to attend to: the one is, where, after the work has been done a few months, it presents the same appearance as if no oil had been mixed with it, the sun and air having quickly dispersed the greater part of its most valuable properties.* The other is where the paint rises up in blisters, which blisters, in course of time peel off, and leave the wood almost bare. Having particularly attended to these two evils, I believe the former to be the greatest, although it has probably been the least noticed, while the latter, is not *always* detrimental to preservation. With regard to the blistering of paint, it chiefly takes place where there have been numerous coatings of chocolate colour or black paint, which had been made very thin with drying oil, but it does not so often occur in white, stone-colour, or lead colour paints; consequently, pigments, whose specific gravity, are the greatest, when diluted with a proper proportion of drying oil, are by far the least liable to blister.

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* I have observed instances, where a kind of moss has vegetated on the horizontal parts of gates, rails, &c. which had been covered by paint of this nature.

I observe, Sir, your proposal of trying an admixture of siliceous, or flinty sand, with paint, to prevent it from rising in blisters, as well as to increase its durability; but I am doubtful as to the propriety of using sand as a *mixture* with paint; for, as the substances, which compose paint of every description, are immersed in the vehicle containing them, may not the particles of the sand you propose to use, with propriety be considered to be themselves first painted, or varnished; and when applied to the coating of wood-work, may not such wood-work, be said to be covered with painted, or varnished particles? I have long considered that paints, even for the commonest purposes, ought to be finely ground: as they are not so liable to be rubbed off, are more easily worked, and more œconomical, to which may be added that they not only present a smoother appearance to the eye, but are more durable. Therefore, no advantage can arise from *mixing* sand with paint; nevertheless, in situations, where a peculiar decay of wood-work is apprehended, as the parts of rails and posts near the ground, water-shoots, &c. &c. it might be used to advantage, in the following manner. After a sufficient number of coatings of paint have been laid on, to counteract the absorption, perhaps two or three, when dry, give it another thick and strong coat, and immediately cast as much of the sand over it, as will adhere to it, (the sand being perfectly free from moisture) which may be done with a sieve or drudging-box: when dry and hard, it will become almost an impenetrable crust, or casing of stone upon wood, and its durability may still be increased, by repeating the same operation, remembering, that the first coat of sand should be fast fixed, by at-least a week's drying, before the second is laid on. This process is intended to be applied, with paint ground in linseed oil; diluted with drying oil; and the incrustation thus formed, will be found valuable for preservation, as well as an antidote to blistering.

I observe, Sir, your having tried the application of powdered charcoal, something in the manner just described for the sand, and it is probable, from its antiseptic quality, it may be usefully applied in damp situations; but it would be better that it should be painted over ultimately, and not left as the sanded work is intended to be.

The substances, which have been generally used, for the preservation of wood-work, exposed to the weather, are not very numerous; and are chiefly Pitch, Tar, Linseed Oil, and some kinds of Animal Oil, and of which different compositions have been made, with minerals, ochres, earths, metallic oxides, &c.

Pitch and tar, from their low price, have been used very extensively, and it is usual to mix with them some spanish brown, in order to give them a body, as well as to cause them to harden after they are laid on. There are inconveniences however attending the use of pitch and tar; they require to be made hot before they are laid on; the second coat will generally, more or less, dissolve the first, and cause them to *work up,* as the workmen call it; and added to which, a powerful sun will melt them for a considerable time thereafter.*

From the objections to which the compositions of pitch and tar are liable, I have for some time been attempting, by a variety of experiments, to overcome them, and flatter myself that my endeavours have not been altogether unsuccessful, by publickly introducing an article, which I call 'Olive Brown Paint.' This from the lowness of its price, which is no more than that of tar, is sufficiently fluid to be used without any heat; it possesses a great body, will soon dry, and is not affected afterwards, as all other tar compositions are, by the heat of the sun; and, moreover, what may be considered by some, an additional recommendation, a coat of linseed oil paint may be laid on over it, after the lapse of two or three months, which no compositions of pitch or tar, that I have hitherto known, will admit of; because they will melt, and crack, *under* the linseed oil paint, even for years after they have been done.

One coat of the olive brown paint, will in many cases, be sufficient for preservation, but two coats will be ample. I am of opinion, that this paint, with an equal quantity of pitch (although I have had no opportunity of trying) would be found very superior for most purposes, where the latter is now used alone, but then, of course it must be laid on warm.*

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* The price of labour is, in this country, a considerabe object, wherefore, in all compositions required to be used warm, this also will be found an objection.

I observe, Sir, the composition you propose, with oil, rosin, brimstone, &c. to be applied warm, and which is no doubt a valuable one: indeed, it is not a little flattering to me to acknowledge, that the essential properties of yours, do not materially differ from those of the olive brown paint, before alluded to. It occurs to me, that your composition might be successfully applied, where pitch is now generally used; especially, whenever the additional expence would not be an objection. There is little doubt in my mind, but that a composition might be formed with pitch, which would be very durable, and not much exceed the price of that article alone. But, that may probably be a subject for future consideration.

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* I would here recommend the pitch first to be well melted, and the paint to be added to it cold, and after it becomes too thick, to be again warmed, but not made too hot.

It has been generally supposed, that compositions of pitch, tar, &c. which are laid on warm, must be more valuable for preservation, than those which are applied cold; but I am inclined to doubt this, although you, Sir, as a philosopher, may see reason to think otherwise: they certainly will not be found so œconomical, because a given quantity of any substance, that is required to be made warm, before it is used, will not cover so large a surface, as an equal quantity of any other that may be applied cold.

Of all the vehicles for paint, hitherto known, linseed oil is acknowledged to be the best, and for preservation, there is probably nothing when mixed with paint, equal to this oil, after it has been properly boiled, with some of the metallic oxides.*

Amongst the different substances used for paint white lead is one of the most important, both as a white, as well as for mixing with other colours; but the ochres being less expensive, form very good, and useful paints, when properly prepared. Spanish brown, or red ochre, is probably the cheapest paint, but it is not deemed a pleasant colour, nor would I recommend it to be used alone. Chocolate colour, Lead colour, and invisible green are preferable, all which are compounded colours. This last colour, I need not inform you, is so denominated, from its being proper for covering gates and rails, in parks, pleasure grounds, &c. by rendering them in a measure invisible at a distance, on account of its approximation to the hue of the vegetation. The other greens, of which, there is so great a variety, may be used according to the situations for which they are intended.

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* Drying oil and boiled oil are synonymous.

In new and valuable wood work, I would always recommend *four* coats of paint to be laid on; because, a good and complete coating of paint, on new work without doors, is in my opinion, of much greater importance, with regard to its duration, than is generally supposed; and this perhaps, will also *particularly* apply to ships, barges, boats, bridges, &c.

Before new work has the first coat laid on, attention should be paid that it is dry, and perfectly free from *sap*; as it is much sooner liable to decay, if painted while it is green. In giving the first coat, it is proper to make the paint tolerably thin with oil, which causes it to flow with greater facility from the brush: the next coat, or coats, should be laid on with a good body, and even; and, the finishing coat, a little thinner,* but not to have so much oil mixed with it, as the *priming,* or first coat.

In wood-work that has before been painted, two coats will generally be found enough, and, I do not recommend less than two, where preservation is required; the first coat to be laid on with a good body, and even; the last a little thinner. It is proper in all cases, that the under coat should be completely dry, before the next is laid on. In the common colours, three, or four coats of the same paints will be no object; but for the finer greens, the invisible green will do for the first and second coats, as two coats of the other greens will be sufficient.

The remark, which you, Sir, have made with regard to oil of turpentine, is just; and it is better that as little of it should be used without doors as possible. In cases where paint may have become too viscid, or what is denominated by painters, *fat,* it will be necessary to add a little to facilitate the using it: and, as all paint is apt soon to get into this viscid state, it is better never to keep it more than a day or two, after it is prepared for use; but the oil should only be mixed with it when required to be laid on. And, here it may be proper to observe, that all paint should be preserved as much as possible from the external air; and if in casks with the heads fastened up, so much the better; in which situation it will always keep longer. A great deal of paint is thrown away, owing to its being permitted to dry up in casks, or jars, to which the air has access, from which circumstance, blame has been sometimes attached to the manufacturer, although without cause. The covering of paint with water is a common custom, and is most proper to be resorted to, where a quick consumption is expected; but generally speaking it would be preferable to cover it with oil.

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* White lead, and all colours, where that forms the basis. must be excepted, as they ought to have the finishing coat laid on with a good body.

It has been before observed that drying oil is the most proper for out-door purposes; it is desirable, both on account of its natural quality of drying, as well as for duration; but where paint has become thick, or viscid, by long keeping, a little oil of turpentine may be added, in order to make it work more pleasantly; although it is better, not to use any, if it can be conveniently done without: it is often added, under the idea of its being a *dryer*, but that is erroneous. If paints are properly manufactured, and are diluted with good drying oil, they will soon become hard on out-door work, without the use of oil of turpentine, or any other article called *dryer*.

In painting out-door work with white lead, it would answer best to dilute it with half drying oil, and half linseed; as the drying oil affects the colour of the white lead a little, but in all other colours, drying oil may be considered the best for the purpose of preservation.

It may be enquired, perhaps, how long after wood work has been well painted, before it will be proper to paint it again, or in other words, how long a good painting will last? I answer, that much must necessarily depend on the climate, and the situation. In this country, I would recommend rails, gates, &c. to be done once in three years at least: but for shipping it will be found advantageous once in six months: and, if exposed to a tropical sun, perhaps once in three months, would not be too often: but, in all such circumstances, no certain rule, can with propriety, be laid down; however, a little attention and observation, will be of more use, than any thing that can be here proposed; and if the hints which have been suggested are properly applied, I sincerely trust they will not be without their advantages. I am, &c.

James Crease.

53, West Smithfield.
1st September, 1808.

JAMES CREASE & SON,

Colourmen and

Manufacturers of Cheap Paint,

53, WEST SMITHFIELD, LONDON.

	s	d
Olive Brown Paint in casks of 30lb. and upwards, per lb.	0	3

OIL PAINTS.

	s	d
Lead Colour,	0	4½
Chocolate Colour,	0	4½
Invisible Green,	0	4½
Stone Colour,	0	5
Black	0	6
Garden Green	0	8
Rich Bottle Green,	1	0
Deep Sardinian Green		20
Light ditto, ditto,	2	0
Rainbow Green,	3	6
Prepared Paint Oil for priming, per gal.	5	6
New Drying Oil,	7	0

White Lead, &c. &c.

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Hazard and Carthew, Printers, Beech-Street, Barbican.